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ANNUAL

OF THE

UNIVERSAL MEDICAL SCIENCES

A YEARLY REPORT OF THE PROGRESS OF THE GENERAL
SANITARY SCIENCES THROUGHOUT THE WORLD.

EDITED BY

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AND

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ASSISTED BY

OVER TWO HUNDRED CORRESPONDING EDITORS, COLLABORATORS,
AND CORRESPONDENTS.

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VOLUME I.



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P R E F A C E.

IT was hoped, judging from the fact that the majority of manuscripts forming the text of the ANNUAL had promptly come to hand, that the work could be placed before the profession much earlier this year than ever before. Unfortunately, all expectations in this direction were annihilated by the tardy arrival of a few papers, and it was only by dint of the greatest effort in both editorial and publishing departments that the seventh series could be made to appear as early as any preceding issue. To the members of the editorial staff, who by their promptness rendered possible even as good a showing as is made, the editor wishes to express his deep gratitude; the extent of the favor thus conferred upon him is far beyond their estimate.

If no progress is shown in the direction of time, quite the reverse may be said concerning the material presented. The editor in no way wishes to exaggerate the merits of his co-workers when he expresses his opinion that many of the reviews presented this year have never been excelled, if at all equalled, in any known work of correlation. The contributions of Professor Lépine, of Lyons, on the diseases of the urinary organs; of Professor Wilson and Dr. Eshner, of Philadelphia, on the different varieties of fever, in the first volume; of Professor Gray and Drs. Pritchard and Shultz, of New York, on affections of the brain; of Professor Obersteiner, of Vienna, on the diseases of the spinal cord; and of Professor Montgomery, of Philadelphia, on the diseases of uterus and adnexa, in the second; of Dr. Oliver, of Philadelphia, on diseases of the eye, in the fourth; and of Drs.

Dujardin-Beaumetz and Dubief, of Paris, on general therapeutics, in the fifth, may be taken as illustrations of the large number of articles entering into this category. Worthy of particular mention in this connection is the paper on syphilis, by Professor White and Dr. Furness, of Philadelphia,—a veritable example of high scientific attainment and thoughtful selection.

In point of accuracy, as regards the text, references, reductions, etc., the editor may also express increased satisfaction. Thanks to the devotion of his faithful friends and editorial assistants, Mr. and Mrs. Eugene Devereux (the latter formerly Miss McCarthy), these features of the work have reached a high degree of perfection. A slight modification in the proof-reading system has also limited the typographical errors to a comparatively small proportion; this is mainly due to the kindness of the members of the associate staff and to Mr. T. S. Coom, reader of the typographical department, whose interest in the welfare of the work manifests itself in many ways. Mr. H. B. Van Horn, manager of the same department, has had more responsibility thrust upon him this year than ever before; he has not only demonstrated an unusual ability, but also a degree of devotion to his duties fully meriting the highest recognition. The publishers of the ANNUAL have, as usual, in many ways facilitated the editor's task, and it is with pleasure that he acknowledges his indebtedness to them. The preparation of a work of such dimensions in so short a time not only demands self-sacrifice on every hand, but also demands that the greatest cordiality pervade the entire corps of workers engaged in its elaboration. This may truthfully be said of the ANNUAL,—the probable foundation of its successful career.

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DISEASES OF THE LUNGS AND PLEURA.

BY JAMES T. WHITTAKER, M.D.,

ASSISTED BY

E. S. MCKEE, M.D., AND S. P. KRAMER, M.D.,

CINCINNATI.

TUBERCULOSIS.

Hereditary Infection.—The discovery by Koch of the specific cause of tuberculosis, and the work of Cornet and others on the infectivity of the inspissated sputum, produced at once a radical change of view regarding the pathogenesis of this disease. Physicians had at all times noted the seeming influence of heredity, but, after the discovery of the bacillus, the theory of heredity underwent a change, being now that the individual inherited from a tuberculous ancestor simply a peculiar predisposition to the disease, but never the disease itself; that the bacillus, inhaled or introduced into the body of such a host, found a more favorable soil for growth, and thus produced the disease. Experiments on the lower animals, however, the reports of competent veterinary pathologists, and a few isolated but well-authenticated cases in the human subject have been reported in which the direct transmission of the bacillus from the mother to the offspring has been established beyond a doubt.

Gärtner⁵⁸ has published the results of an extensive investigation and a general and comprehensive review of the entire subject. According to him, the influence of heredity may be (1) inheritance of the specific germ of the disease; (2) inheritance of a peculiar predisposition which favors the acquisition of the disease in after-life. The variations in this peculiar predisposition must be the only explanation for the varying ease with which different persons acquire the disease, and for the varying degrees of virulence with which it affects different individuals. The predisposition is increased by all causes which produce a general or local weakness. It may depend upon mechanical causes or upon the chemical con-

stitution of the cells and fluids of the body (as in diabetes). Differences in virulence may find their explanation in differences of the degree of virulence possessed by the germs, as held by Baumgarten and others. There is, however, no evidence that tubercle bacilli of varying virulence occur naturally; and this leads Grtner to hold the view that differences in virulence in the disease are due to differences in predisposition. The author details experiments in which he established the possibility of foetal infection. White mice, canary-birds, and rabbits were used. These animals, while they are susceptible to the disease, do not succumb for at least three months after the injection of considerable numbers of tubercle bacilli. Of 110 young mice, the offspring of 24 tuberculous (inoculated) mothers, 2 were found to be tuberculous. Of 9 eggs coming from 2 tuberculous canary-birds, 2 contained tubercle bacilli. The *possibility* of foetal infection is, therefore, established. A further series was directed toward the question of placental infection. Intra-venous injections of tubercle bacilli were made in 10 pregnant rabbits. From four to seventeen days intervened between injection and parturition. Of the 51 young, 5 (*i.e.*, 10 per cent.) contained the tubercle bacillus immediately after birth. The entire litter was never found to be tuberculous in any one case, but 1, or at least 2, were found to contain the germ. The infection took place after the injection of small or large quantities of the bacilli in the mother. To determine whether mothers with pulmonary tuberculosis transmitted the disease to the offspring, 9 mice were inoculated through the trachea with the bacillus. Of these 9, 7 produced tuberculous young in from fifty-six to two hundred and fifty days after inoculation.

Thus it appears that animals with pulmonary tuberculosis may infect their intra-uterine young. Twenty-two male rabbits were inoculated with tuberculosis in the testicle, but, although the semen contained the bacillus, they failed to produce tuberculous young. The author's conclusions are that the young of tuberculous mice, rabbits, and canary-birds may frequently be inoculated with tuberculosis from the mother. As the result of these experiments, and since statistics show that the mortality from tuberculosis in man is greatest during early childhood, he believes himself to be justified in the opinion that in the human subject as well the bacillus may be transmitted from the mother to the foetus;

but, further, tuberculosis is not transmitted directly from the father to the child.

Lehmann⁶⁹ reports a case of placental tuberculosis. Five minutes after the death of the mother from acute miliary tuberculosis an eight-month-old child was removed by Cæsarian section. The child had apparently died shortly before. Examination of its organs failed to demonstrate tubercles or the tubercle bacillus. A number of gray tubercles containing the bacillus were, however, found in the placenta.

Fermi and Salamo⁵⁰ experimented with a view of ascertaining whether predisposition to tuberculosis can be induced in animals either naturally or but little liable to the disease. Guinea-pigs, which readily acquire human tuberculosis, were inoculated with the bacilli of fowl tuberculosis. Mice were inoculated with bacilli of both kinds. The results were as follow: Exposure for several weeks to a temperature of 33° to 35° C. (91.5° to 95° F.), especially in an atmosphere saturated with moisture, or the hypodermic injection, during long periods, of dextrose and lactic acid together, produced decided predisposition to fowl tuberculosis in guinea-pigs and mice; and in the case of mice a predisposition to human tuberculosis was also produced. In order to determine whether the virulence of tubercle bacilli could be increased, a second series of experiments was made, showing that animals previously immune were no longer so when subjected to the action of bacilli which had been repeatedly inoculated into guinea-pigs previously predisposed in the manner above stated. The virulence of the organism is therefore enhanced by this procedure.

Mixed Infection.—The opinion is rapidly gaining ground that the disease known as pulmonary phthisis or pulmonary tuberculosis is not a simple infection,—*i.e.*, is not produced by a single micro-organism. The bacillus of tuberculosis is undoubtedly accountable for the formation of the typical lesion, namely, the tubercle. The various changes, however, which are generally associated with this lesion, known as bronchitis, pneumonia, cavity-formation, etc., are undoubtedly produced by micro-organisms much more destructive in character, and which give rise to diseases much more septic than that of the tubercle bacillus. Koch, in his original work on the etiology of tuberculosis, called attention to the importance of those micro-organisms which are found,

in the sputum of tuberculous patients, accompanying the tubercle bacilli. The possibility of separating the micro-organisms coming from the lung from those which are added to the sputum from the secretions of the mouth was made possible by the method which Koch recently gave for obtaining pure cultures from the sputum. Kitasato⁸² and Cornet⁸⁴ have reported the presence of streptococci in tubercular cavities.

Petruschky⁶⁹ published the result of his investigations on this subject, carried on in the Koch Institute for Infectious Diseases. Cultures were made from cavities in all fatal cases of phthisis. The sputum was also examined microscopically and by the culture method. The author found that the streptococcus was, by a large majority, the most frequent, especially in cases of phthisis accompanied with fever, and in a number of febrile cases. A streptococcus was also found in 8 cases, in the blood and tissues of all the organs. This infection is to be regarded not as of a mixed character, but as one due to streptococci, secondary to the tubercular infection. In the light of these results, the peculiar hectic fever found in the advanced cases of tuberculosis is to be looked upon as the same as that in erysipelas, puerperal fever, and in all the various wound infections. The author, following Koch, names this characteristic temperature curve the "streptococcus curve." This fact has a tremendous bearing on the various specific treatments, notably that with tuberculin, which Koch states is only to be used in the beginning of cases of tuberculosis; and Petruschky confirms the experience of clinicians that the use of tuberculin in the hectic cases is inadmissible. Kramer,²¹³ in his report on tuberculin, drew attention to the dangers attending its use in septic cases. Experience showed that cases with hectic fever grew progressively worse, the explanation offered being that the hyperaemia produced in the lung at the periphery of every tubercle by the injection of the tuberculin would only aid the streptococcus process. The only rational treatment in these cases lies in support of tonic measures until the end of the septic process is brought about. Then only is the tuberculin treatment admissible.

Ortner,^{211; 84} from an examination of 61 cases, believes that the micrococcus of pneumonia is accountable for the inflammatory processes which accompany tubercle in cases of pulmonary phthisis.

The Tubercle Bacillus, etc.—Fischl¹³ studied the various forms of tubercle bacillus described. He regards the Koch tubercle bacillus as the parasitic form of an originally saprophytic fungus, similar to that of actinomyces, and avian tuberculosis as a sub-species produced through differences of the soil upon which it is grown. He believes that we can differentiate between the bacillus of miliary tuberculosis, of murrain (*perlsucht*), and that of avian tuberculosis. The bacillus of avian tuberculosis has, through differences of soil, lost the property of producing tuberculosis when inoculated upon mammals; and he believes that this property can be restored under certain as yet unknown conditions.

Sander³²⁴_{p.228, 32} succeeded in growing tubercle on acid potato without any trouble; in fact, he found that the difficulties attending the saprophytic cultivation of the tubercle bacillus had been greatly exaggerated. Growth, although slight, occurred on various vegetable media, the virulence, however, tending to diminish.

Amann⁵⁰_{v.15, No. 11, 12} gives the results of 4000 examinations of sputum obtained from 1792 patients. The bacillus was found in 1498, or 83 per cent. of the patients. In 30 per cent. repeated examinations were necessary. Of 856 cases observed for some time, an entire and permanent disappearance of the bacilli was found in 16, or 1.7 per cent.; a considerable decrease in 144 cases, or 16.8 per cent.; and a considerable increase in 254 cases, or 29.7 per cent. No notable alteration was observed in 442 cases, or 51.5 per cent. Elastic fibres were seen in eight patients whose sputum was always free from bacilli. Four of these were cases of bronchiectasis, 1 of pulmonary abscess, and 3 of doubtful nature. Of the tuberculous patients, these fibres were not found in 11 per cent., or 167 cases. The greater number were young persons with incipient phthisis. In the other 1331 patients both bacilli and elastic tissue were found; so that the presence of the bacilli in the sputum is more constant than that of elastic fibres. According to Amann, a persistent increase in the number of tubercle bacilli in the sputum never accompanies a permanent improvement in the general health; indeed, he thinks the opposite to be true, namely, that an undeniably parallelism exists between the number of the bacilli and the progress of the disease. A permanent cure of pulmonary tuberculosis is not possible without total and permanent disappearance of the bacilli.

J. Grancher and Ledoux-Lebard⁴⁵⁷ sought to determine the temperature which will destroy the virulence of the bacillus tuberculosis without destroying its capacity for growth. Their researches extended both to the bacillus of human and avian tuberculosis. For the avian bacillus, they found that pure cultures in distilled water or bouillon withstood a temperature of 50° C. (122° F.) for fifty minutes and 60° C. (140° F.) for ten minutes. Temperatures between 70° and 100° C. (158° and 212° F.) killed the cultures within one minute. The virulence was unchanged after fifteen minutes at 50° C. (122° F.), was markedly diminished after fifteen minutes at 60° C. (140° F.), and disappeared entirely after fifteen minutes at 70° C. (158° F.). When dried the cultures withstood a temperature of 45° C. (113° F.) for twenty-one days. They died, however, after twenty-six days. At 50° C. (122° F.) they retained their vitality seventy-two hours; at 60° C. (140° F.), forty-eight hours; at 70° C. (158° F.), fourteen hours. At from 80° to 100° C. (176° to 212° F.) they were sterilized within a few hours. After remaining for two months at the temperature of the room, virulence was undiminished. After three months a marked attenuation was noticed, the same result after one month at 40° C. (104° F.). The human bacillus in distilled water was capable of growth after heating for fifteen minutes at 50° C. (122° F.). A temperature more than 60° C. (140° F.) produced sterilization. The human bacillus seems, on the whole, to be much more susceptible to these temperatures than the avian. Virulence diminished after five minutes at 60° C. (140° F.). After ten or twenty minutes at 60° C. (140° F.) this diminution was extreme. After one, two, five, and ten minutes at 70° C. (158° F.) virulence was lost. The temperature of 100° C. (212° F.) for a half-minute was sufficient to destroy virulence. In the dried state, virulence remained after from two to seven hours' exposure to 70° C. (158° F.), and after three hours' exposure to 100° C. (212° F.).

Latent Tuberculosis of the Lymph-Glands.—Pizzini¹¹⁴ has repeatedly found in the glands, more especially in the bronchial lymphatic glands of people who have shown no sign of tubercular disease, virulent tubercle bacilli. These bacilli had, in all probability, come from the respiratory mucous membrane, and might at any time set up tubercular disease. Spengler⁵⁸ found tubercle bacilli in the bronchial lymphatics of six children who had died of

diphtheria, sepsis, etc., who had shown no symptoms of tuberculosis. With one exception, this was the only place where tuberculosis was present. The author supposes that the bacilli penetrated into the glands from the respiratory mucous membrane. H. Neumann⁶⁹ believes tubercular disease of the bronchial gland to be most frequently the first stage of the disease in children. The inhaled bacilli are carried to the nearest gland, and may here either be destroyed or, after a variable time, owing, perhaps, to some intercurrent affection (catarrh, inflammation, etc., of the lungs), may be carried to any part of the body to produce the various tubercular affections. In regard to the diagnosis of tuberculosis of the bronchial gland, he mentions peculiar spasms of coughing and bronchial breathing in the neighborhood of the upper dorsal vertebrae as the most frequent manifestation. The establishment of the diagnosis, however, is possible only in the most advanced cases.

Statistics, etc.—The statistical papers during the last year have been along the same line as heretofore. Holsti¹¹⁴_{p.317} finds that the mortality from tuberculosis is greatest during the first two years of life. From the ages of 5 to 15 it is least. It then rises steadily until between 31 and 40 years, when it reaches its maximum. In males the mortality remains rather high until the age of 60. In females it gradually falls after 40. Weitemeyer,³⁴_{No. 26, 27} from a consideration of the mortality from tuberculosis in Munich from 1814 to 1888, comes to the following conclusions: The mortality for 10,000 inhabitants ranges from 46 to 48 per year. This rate does not seem to be diminishing. The prevalence of tuberculosis, according to this author, is, as Flick showed two years ago, in direct ratio to the number of persons who are confined in close quarters. He regards fresh air as the greatest prophylactic factor. Frequent and extensive variations of temperature seem to aid in the development of the disease. Wulff²⁹⁵_{p.629} calls attention to the frightful mortality from tuberculosis in the idiot asylums in Germany. The chief causes are overcrowding and defective medical supervision.

On the Influence of Certain Professions upon Mortality in Phthisis.—Baranoff²⁰³_{1892; Feb.}⁶⁷³ gives statistics concerning the influence of certain occupations upon the mortality in phthisis in St. Petersburg. He examined the medical certificates of all persons who died of phthisis during the space of ten years, from 1881 to 1890,

as well as certificates of all persons who succumbed to other diseases during a space of three years. He ascertained as well the number of persons occupied in the different trades in St. Petersburg, in order to estimate the mortality by phthisis for each trade. In order to verify his work, he used the statistical returns of the population of St. Petersburg from 1881 to 1890. His conclusions are as follow:—

1. That, for the most part, the trades exercising a pernicious influence upon individuals are those which produce the most dust.
2. That mortality from phthisis is much greater than from any other disease among those persons whose work is sedentary.
3. That, contrary to the opinion of certain authors, vegetable dust must be considered much less injurious than mineral, and animal dust as the most dangerous, since it may act as a means of transportation for tuberculous bacteria.
4. That compositors attacked by consumption succumb the most rapidly. [Is it not from close breathing?]
5. That the occupation of blacksmithing, which is mostly undertaken by robust and healthy men, causes great mortality. [?]
6. That excessive singing likewise predisposes to the disease and hastens its progress.
7. That domestic service, including that in restaurants, has apparently no influence upon the health as regards predisposition to phthisis.
8. That all occupations requiring long and tiresome physical labor greatly shorten the life of consumptives.
9. That phthisis attacks hack-drivers less frequently than those engaged in other occupations, and makes slower progress in them.
10. That the work of bathing-masters has a favorable influence in preserving them from consumption.
11. That the minimum age of persons dying from phthisis is as follows:—

Compositors, . . .	30.9	years.	Shoemakers, . . .	34.4	years.
Painters, . . .	31.5	"	Sculptors, . . .	34.5	"
Singers, . . .	31.6	"	Chimney-sweeps, .	34.5	"
Waiters, . . .	31.6	"	Carpenters, . . .	34.8	"
Upholsterers, . . .	33.5	"	Blacksmiths, . . .	35.1	"
Joiners, . . .	33.6	"	Factory-hands, . .	35.2	"
Plasterers, . . .	33.7	"	Copyists, . . .	35.7	"
Tailors, . . .	33.8	"	Teamsters, . . .	36.2	"
Clerks, . . .	34.0	"	Day-laborers, . . .	36.9	"

12. In dividing the occupations according to the mortality by phthisis,—that is to say, the number of persons in each trade,—the following results are given:—

Copyists, . . .	16.2 per mille.	Upholsterers, . . .	9.2 per mille.
Turners, . . .	14.7 "	Painters, . . .	9.2 "
Factory-hands, . .	13.0 "	Carpenters, . . .	8.6 "
Pavers, . . .	13.0 "	Ropemakers, . . .	8.5 "
Engravers, . . .	12.6 "	Compositors, . . .	8.3 "
Locksmiths, . . .	11.7 "	Bronzers, . . .	7.8 "
Hair-dressers, . . .	11.5 "	Roadmakers, . . .	7.8 "
Blacksmiths, . . .	11.2 "	Shoemakers, . . .	7.7 "
Tailors, . . .	10.8 "	Joiners, . . .	7.3 "
Bookbinders, . . .	10.5 "	Tin-workers, . . .	7.2 "
Plumbers, . . .	10.1 "	Coppersmiths, . . .	7.2 "
Jewelers, . . .	9.6 "		

13. The following figures show the maximum mortality by phthisis in comparison to general mortality:—

Engravers, . . .	58.3 per mille.	Clockmakers, . . .	47.4 per mille.
Hair-dressers, . . .	53.2 "	Coppersmiths, . . .	47.1 "
Compositors, . . .	53.1 "	Bookbinders, . . .	46.4 "
Bronzers, . . .	52.7 "	Tin-workers, . . .	46.4 "
Tailors, . . .	50.9 "	Locksmiths, . . .	46.9 "
Roadmakers, . . .	50.6 "	Shoemakers, . . .	46.7 "
Copyists, . . .	50.4 "	Furriers, . . .	46.2 "
Jewelers, . . .	50.1 "	Boxmakers, . . .	45.6 "
Upholsterers, . . .	48.5 "	Carpenters, . . .	45.1 "
Singers, . . .	47.6 "		

14. In considering the liberal professions, it is impossible to arrive at a positive result as to their influence upon mortality by phthisis, the more so since the majority of persons following them leave St. Petersburg upon being threatened with consumption. Among these are many physicians, who well know the danger consequent upon their sojourn in this city. It can, therefore, only be stated that, from 1881 to 1890, but 46 physicians died of consumption in St. Petersburg, while in the space of only three years 64 physicians died of other diseases. The total number of physicians, according to the census, in 1881, was 1311; and in 1892, 1530.

As regards the age reached by persons following the liberal professions, employés in general die of consumption at the age of 44 years, of other affections at the age of 58; phthisical physicians reach the age of 45, and in other diseases 55; consumptive police officers live to the age of 42, and those attacked by other maladies to the age of 53. Priests and laymen live the longest; they die

of consumption at 50 years, and of other diseases at 62. (Report of Corr. Editor Drzewiecki, Warsaw.)

Symptomatology.—Baëmller⁶⁹ regards what is known as galloping consumption as the broncho-pneumonia following or developing in the course of a case of tuberculosis, and brought about through the inspiration into the bronchial tubes of the contents of phthisical cavities. The pneumonia begins suddenly with high fever and haemoptysis, the latter continuing and seeming to be especially characteristic. Fine moist râles, and later, perhaps, tympanitic dullness, are found toward the end; there is difficult breathing and great weakness of the heart without any special emaciation.

Strümpell³⁴ calls attention to the great prognostic importance of the fever in pulmonary tuberculosis. Generally speaking, a case of phthisis which continues afebrile may be regarded as mild. A subfebrile condition with slight evening rise is more serious, while the typical intermittent hectic fever denotes rapid progress of the disease. The same holds good in determining the value of the various drugs. Strümpell believes that if a given remedy does not control the fever it does not control the disease.

Diagnosis.—Delépine² calls attention to the importance of the inoculation method in the diagnosis of tuberculosis. He publishes the result of twenty-eight inoculations on guinea-pigs with tuberculous matter obtained from various sources. (See illustration.) These inoculations were made under the skin, on the inner aspect of the leg at the level of the knee, and were followed by tuberculosis of the various organs in the following order:—

During the second week, the lymphatic ganglia on the same side of the body below the diaphragm and the spleen; during the third week, the liver, mediastinal and bronchial ganglia; during the fourth week, the lungs, cervical and axillary ganglia; after the fourth week, some of the lymphatic ganglia of the opposite side of the body below the diaphragm become gradually affected, but this takes place very slowly, and the sublumbar and popliteal glands escape for a considerable time. As the result of his investigations, he concludes:—

“ 1. The inoculation method is a method of diagnosis capable of giving results free from any ambiguity. 2. The negative results obtained by it are nearly as valuable as the positive results. 3.

The positive results give more definite information than the discovery of the bacillus tuberculosis. 4. Results should easily be obtained within two or three weeks."

Treatment.—

Albu⁶⁹ gives the results obtained at the Moabite Hospital during five years with creasote. The highest dose given is 2 grammes (31 grains) a day. A number of patients took as much as 450 grammes (14½ ounces) during the course of treatment. The author found that the most that can be said of creasote is that it is of value against certain of the symptoms. In some cases it acts as a good expectorant; in others as a stomachic and tonic. It had no influence on the fever, and was absolutely without specific value. Chrostowski and Wistocki,⁴¹ on account of the disadvantages which

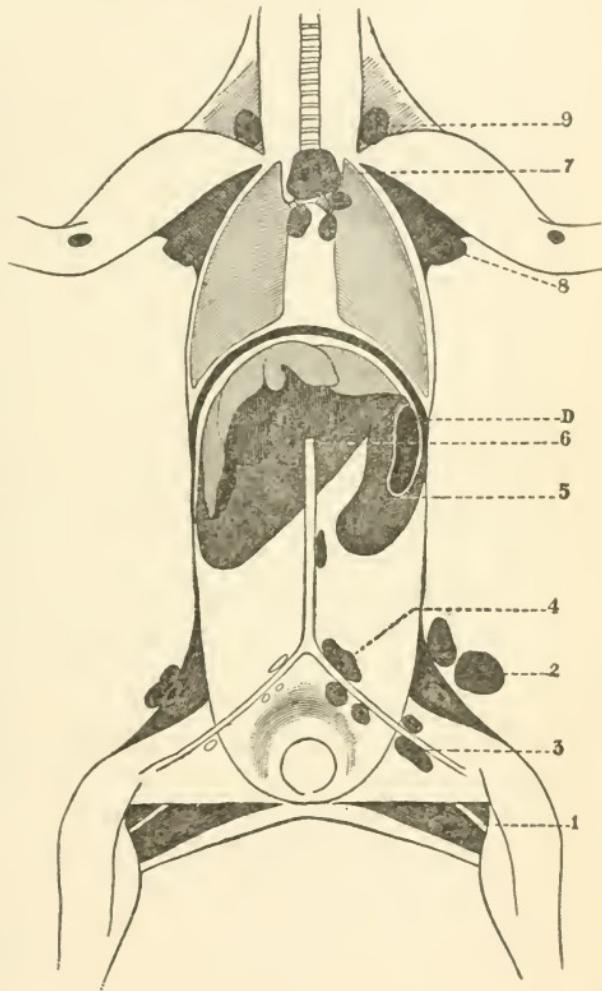


DIAGRAM OF A GUINEA PIG FOUR OR FIVE WEEKS AFTER SUBCUTANEOUS INOCULATION OF TUBERCULOUS MATTER ON THE INNER ASPECT OF THE LEFT LEG. (DELÉPINE.)

The black outline indicates approximately the normal size; the lighter outline, the size of the organs when the tuberculous processes have become established. 1. Popliteal ganglion. 2. Superficial inguinal ganglion. 3. Deep inguinal ganglion. 4. Sublumbar ganglion. 5. Spleen. 6. Retrohepatic ganglion. 7. Mediastinal and peri-bronchial ganglion. 8. Subscapular ganglia. 9. Inferior deep cervical ganglia. D. Diaphragm.

British Medical Journal.

very often attend the administration of creasote by way of the mouth, have experimented with its use by way of the rectum. They found that injections were well tolerated by all

their patients, giving rise to no irritation of the bowel. In two cases diarrhoea was arrested. The writers made use of this procedure in fourteen cases. The rectum was always cleansed by means of an ordinary injection of warm water before the creasote was introduced. In five patients, whose nutrition was still good, but in whom fever was already present, a more or less decided improvement resulted. Seven patients received no benefit from the injections, which the authors ascribe to the fact that the individuals were in an advanced state of tuberculosis with high fever. In only two cases was there an aggravation of the symptoms. The taste of creasote was perceived in the mouth in a few minutes after an injection had been made, and in a few hours afterward the temperature fell 1° or 2° C. (1.8° to 3.6° F.). Another evidence of rapid absorption was the occasional occurrence of green or dark-colored urine. Guida⁵⁸⁹ _{Oct., '92} prefers giving the drug in children by the rectum, in an emulsion of almond- and olive-oil or in alcoholic solution. The dose is progressively increased from 0.025 gramme to 1 gramme ($\frac{2}{5}$ to $15\frac{1}{2}$ grains) during the day.

Whittaker,⁸⁰ _{Jul,} after a thorough review, reaches the following conclusions: 1. Creasote, when pure, is harmless. 2. It has no direct action upon the tubercle bacillus. 3. Tuberculosis pulmonum is chiefly a secondary infection by a streptococcus. 4. Creasote has no direct action upon this streptococcus, hence none whatever upon hectic fever. 5. It destroys lower organisms, especially those which produce fermentation, without affecting the process of digestion. Hence (6) the virtue of creasote, undeniable in most cases, is chiefly, but not wholly, exerted upon nutrition.

Within late years, as reported in previous issues of the ANNUAL, guaiacol, obtained from the distillation of guaiacum resin,—which is the chief ingredient in beech-wood creasote,—has been used in its stead. Reese reports the results in sixty-six cases at the Johns Hopkins Hospital. The drug had no definite effect upon the temperature, pulse, or respiration. In a number of cases the cough decreased and expectoration was lessened. It had no specific influence. It has the important advantage over creasote that it is less liable to produce gastric disturbance. Picot⁶⁹ _{No. 30} recommends the use, by hypodermatic injection, of a mixture of guaiacol and iodoform in sterilized olive-oil. Every cubic centi-

metre ($15\frac{1}{2}$ minims) of the solution contains 0.01 grammie ($\frac{1}{6}$ grain) of iodoform and 0.05 grammie ($\frac{7}{8}$ grain) of guaiacol. The mixture is clear, and its injection causes no pain and is free from danger. It seems to have a good effect upon the cough and upon night-sweats. Peter¹⁰⁰ obtained satisfactory results from the use of this treatment in twenty-five cases.

Héricourt and Richet⁵⁵ give an account of further experiments on protective vaccination, which fully confirms the results previously obtained by them. Of seven dogs that had undergone successive vaccinations with tuberculosis of birds, not one became affected with human tuberculosis when inoculated. They were inoculated in April last, and are still perfectly healthy and have gained in weight. Of twenty-one dogs inoculated with human tuberculosis, without previous vaccination, all lost weight and died, on an average, in four weeks; of this number, eleven were treated, after the inoculation, by various therapeutic measures, all of which were absolutely ineffectual.

Landerer⁶⁹ recommends as his treatment the intra-venous injection of cinnamic acid. According to this author, the injection produces a peculiar inflammation about each tubercle, which finally leads to cicatrization, thus rendering the tubercle and tubercle bacilli incapable of further growth. Landerer uses a 5-per-cent. solution of the cinnamate of soda, and injects at first, with a thoroughly-sterilized syringe, one-half interspace of the marking on the barrel, increasing one-half interspace every other day. The injections are made into the veins of the arm, which are caused to swell by bandaging above as for venesection. Landerer claims to rescue all cases of afebrile phthisis and a notable percentage of febrile cases. He cures, he says, cases of intestinal disease by dosage by the mouth. I can testify abundantly to the ease and safety of the method, but not much, as yet, to its value.

Tuberculin continues to be employed in a careful and rational manner by certain clinicians. All authors seem to be agreed that its use should be confined to the early and afebrile cases with little likelihood of complication with streptococcus infection. Kaatzer⁵⁸ treated forty-four patients from December, 1890, to February, 1893. He reports fourteen definite cures. His conclusions are: 1. Tuberculin, properly administered, in properly-selected cases, is a harmless and helpful remedial agent. 2. Its curative properties are

lasting. 3. It should be combined with every possible means, medical and hygienic, which have proven to be of benefit. 4. The treatment is best combined with the care that can be observed in special institutions having the best possible climatic surroundings. 5. The use of creasote in combination is of special benefit.

Thorner⁶⁰ _{Sept. 14} reports good results from the use of tuberculin in private practice. The initial dose in all cases was $\frac{1}{20}$ milligramme ($\frac{1}{1200}$ grain), followed by an increase of $\frac{1}{20}$ milligramme ($\frac{1}{1200}$ grain) every other day until $\frac{1}{2}$ milligramme ($\frac{1}{130}$ grain) was reached. The increase was then made $\frac{1}{10}$ milligramme ($\frac{1}{600}$ grain) at a time, at similar intervals, until 1 milligramme was given. At this point those patients who still showed fever were excluded from the treatment. In the other cases the injections were made twice a week, the increase being $\frac{1}{5}$ milligramme ($\frac{1}{300}$ grain) until 2 milligrammes were reached, when an increase of $\frac{1}{2}$ milligramme ($\frac{1}{130}$ grain) was made until 5 milligrammes ($\frac{1}{2}$ grain) were given. The increase was then steadily advanced, according to the condition of the patient, not going higher than 50 milligrammes ($\frac{7}{3}$ grain). Occasional pauses for a few weeks were made, and the treatment resumed, beginning with 1 milligramme ($\frac{1}{64}$ grain) and increasing as before, but more rapidly. The author highly recommends this treatment, and deems it devoid of danger. Von Ruck.⁶¹ _{June 15}, as the result of over two years' experience, is a strong advocate of the remedy. He is fortunate in being able to combine the treatment with every hygienic and climatic advantage offered by a well-equipped sanitarium. He uses the small and gradually increasing doses described above. Dennison⁶² _{Nov.} finds the same advantage from a proper use of the drug.

I have had no occasion to change the opinion expressed continuously in the ANNUAL, that tuberculin remains as yet the only radical address, and that the estimate of its value will increase.

Carasso, of Genoa,⁶³ _{Dec. 2} claims to have cured thirty-nine cases of all kinds or degrees of tuberculosis pulmonum by the continuous inhalation of the oil of peppermint, together with internal administration in 1-per-cent. solution or mixture with creasote. The improvement begins at the minimum in thirteen days, at the maximum in sixty days, and is marked by a disappearance of the bacilli in the sputum, also of physical signs in the chest, with restoration to health in every respect.

PNEUMONIA.

Broncho-pneumonia due to the inspiration of the contents of tuberculous lung-cavities is discussed by Bäumler.^{69 Jan. 5} It is one of the most dangerous complications of phthisis pulmonalis. During a deep inspiration, as in great exertion or following the rupture of an artery from extension of the ulceration, the bronchial tubes are filled with blood; the poison, together with the cavity contents, is drawn into the remotest bronchial tube. Treatment is of little avail, and is chiefly prophylactic. Consumptives with cavities should under no circumstances undergo any severe physical exercise causing forced respiration. In all cases of haemoptysis, even where the tubercular lesion is latent, absolute rest is imperative.

An aspiration pneumonia, due to the breaking down and rupturing into the right bronchus of anthracotic glands, is reported by Kohn.^{34 Jan. 17} Polypoid masses were seen in the alveoli, made up of thickly-set spindle-cells. In some cases these masses were attached to the alveolar walls; in others they had grown down from the infundibula. The question is discussed whether these pores are always present, and it is suggested that if not normally present their existence is due to the desquamation of the epithelium.

A case of meningitis caused by the pneumococcus is reported by Chegelle and Prieur,^{243 Dec. 72} in a soldier aged 22 years. It pursued a normal course, but convalescence was slow and the patient remained debilitated. Almost four months after the cessation of pneumonic symptoms he was seized with violent delirium and died in a few hours. Necropsy showed a yellow exudate within the dura mater, bouillon and gelatin cultures of which proved that it was caused by Fraenkel's pneumococcus. Such cases are observed where there is a prevalence of the grave form of pneumonia usually accompanied by endocarditis, pericarditis, or some other extra-pulmonary complication,—a pneumonia which differs from the ordinary form, and to which Germain Séé has given the name of infecting pneumonia.

Pneumonia followed by ulcerative endocarditis and meningitis is reported by Sainsbury.^{6 Feb. 18} The case shows a sequence of events frequently witnessed, viz.: lobar pneumonia, malignant endocarditis; also the further occurrence of meningeal trouble is not unusual. The presence of a small abscess in the centre of

the pneumonic lobe is not rare in pneumonia. An attack of pneumonic fever a year before death made the lesions of the aortic valve appear recent at the necropsy, but the subsequent and fatal endocarditis may have been grafted upon a slight damage of this kind.

Pneumonia following carbonic-acid poisoning is reported by Dufournier,¹⁰⁰ the disease being induced by serious poisoning from charcoal-fumes in an attempt to commit suicide. The whole right lung became consolidated with the usual physical signs of pneumonia and rusty sputa, but the temperature only twice reached 100° F. (37.8° C.).

Paralyses after pneumonia (decidedly rare complications) have been studied by Boullocke.²⁰¹² _{Nov. 92} ⁶ _{Dec. 10, 92} He divides such paralyses into two groups, according as they occur early in the course of the primary disease or in the later stages. Most of the former are of a hemiplegic type; in rarer instances the paralysis is confined to a single extremity or region of the body. It occurs both in young and old people, appearing either after the physical signs and symptoms of pneumonia are fully developed, or completely masking the lung affection, so that the true state of affairs can only be discovered on post-mortem examination. This is particularly the case with old people in whom paralysis follows pneumonia, and is the more remarkable in that no local lesion can be discovered to account for the hemiplegia as Boullocke found in seven out of seventeen cases in medical literature. The only pathological condition which could be detected in the brain after death was an atheromatous condition of the arteries. A case of bilateral paralysis following pneumonia is also reported by Krafft-Ebing.

Thoracic deformation consecutive to a gangrenous pleuro-pneumonia is reported by Vergely.¹⁸⁸ _{Apr. 2} Autopsy demonstrated polycystic supra-renal capsules, one containing 60 grammes (2 ounces) of a caseous magma. There was incurvation of the vertebral column. The bronchi did not present a trace of dilatation. The lung was strongly adherent to the costal surface.

Leucocytosis as an element in the prognosis of pneumonia has been studied by Cabot⁹⁹ _{Aug. 8} and Carini.⁵⁷ _{Aug. 27} As far as figures go, it would seem that, while the presence of leucocytosis is not a very hopeful sign (one-fourth of those in whose blood it was found having died), its absence makes the outlook bad.

Treatment.—Digitalis in the treatment of pneumonia is still

receiving much attention. Petrescu ²²³_{No. 5, '92} still writes voluminously and with great hope. Fikl ⁸⁴_{No. 8, '91} has treated one hundred and eight cases, during the past twenty-seven months, with large doses of digitalis, and is much pleased with his results. The drug has also been favorably reported upon by Kelley. ⁸⁰_{Dec. '92} In the practice of Hare a number of cases illustrated the fact of the tendency of pneumonitis toward recovery, provided the vital powers, especially the heart, be maintained. If this be done, preferably with digitalis assisted by belladonna and strychnine, pneumonitis will not be as fatal a disease as some would have us believe.

The value of cardiac tonics in pneumonia are discussed by Lazarro, ¹¹⁴⁷_{June 15, Sept. 16}² who draws attention to the successful use of digitalis in pneumonia, and expresses the opinion that the drug acts by re-enforcing the systole of the heart, enabling it to surmount the circulatory obstacle set up by the congested lung, thus doing away with the edema. In order to confirm his view, the author has tried two substitutes for digitalis, viz., strophanthus and adonis, both of which have a more prompt action than digitalis. His results were all that could be desired. He holds it unadvisable to employ digitalis or other cardiac tonics as a routine practice in pneumonia. Their use should be reserved for cases in which the heart is compromised.

Larrabee ¹⁹_{Mar. 11} considers strophanthus a far safer and more effectual remedy than digitalis, acting on the ganglionic motor centres in the heart without affecting the arterial tension. Caffeine and strychnine may also be used to advantage. Larrabee says that digitalis stimulates a weak heart by contracting the arteries and arterioles, throwing the blood back upon the heart itself. Where there is no pulmonary obstruction the action is prompt and efficient, but the very condition which is killing the patient in pneumonia is rendered still more dangerous by such an agent. Cardiac stimulants are recommended in acute lobar pneumonia by Roosevelt. ⁵⁹_{Dec. '92} Alcohol is of great value, but strychnine is overlooked by the majority of the profession. Especially is this valuable in the case of excessive drinkers, given in large doses and preferably hypodermatically. The hypodermatic injection of borax has produced marked modification in the duration and progress of the disease in the hands of Runeberg ⁴⁹⁸_{p. 507, June, '92; Apr. 10}, ⁹⁹⁶ in the clinic of Helsingfors.

Ergot has been successfully used by Van Schaick.⁸¹⁴ From the observations of others, as well as himself, he is led to believe that it relieves the symptoms of pulmonary congestion more rapidly and effectually than any other therapeutic measure; that it may cause a limitation of the area involved by the pneumonic process; that in some cases it may possibly arrest the progress of the disease, and that the remedy is always tolerated in full doses as described.

Ice in the treatment of croupous pneumonia is recommended by Mays.⁹ Jan. 21, June 24 He continuously surrounds the affected area, front, side, and back, with rubber ice-bags well wrapped in towels. Care must be exercised to prevent the ice-bags from leaking or moving away from the chest. An ice-bag is also placed on the head, and from $\frac{1}{20}$ to $\frac{1}{25}$ grain (0.003 to 0.0026 grammes) of strychnine given by the mouth every three or four hours, with an injection of $\frac{1}{30}$ grain (0.002 grammes) of the same drug once a day until its physiological action becomes apparent in restlessness. This may, perhaps, be first observed in the lower extremities, the reflexes of which are usually enhanced. Morphine should be given hypodermatically to induce sleep, and 3 ounces (93 grammes) of freshly-expressed beef-juice, milk, and whisky by the rectum. A tablespoonful of beef-powder in chocolate or coffee is a most valuable food in these cases, when given every three hours.

Transfusion of blood from convalescent cases in the treatment of pneumonia is reported by Hughes and Carter.⁸⁰ Oct. 15, '92 In all (thirty cases) definite results followed the injection. It is true that in five of these the crisis might have been normal, but, leaving these aside, there are still enough cases to at least suggest that in the blood of persons or animals after pneumonia there exists a substance antidote to pneumonia. Many more investigations will be necessary before the question is definitely settled, and most important among them is the isolation of the anti-pneumotoxin. Reports on this subject are also made by Fourrière.²¹

The sero-therapeutics of pneumonia are discussed by Audéond,¹⁷ who states that the doctrine of immunization has been extended and applied to fibrinous pneumonia. He prefers to make the injections into the subcutaneous cellular tissue of the thigh, in preference to intra-venous injection, for fear of accidental clotting; the syringe is sterilized and warmed and the part pricked

is thoroughly cleansed. In all these attempts the object sought is the anticipated production of the crisis which should terminate the disease, and which Netter considers to be due to a rapid and very marked attenuation of the pneumococci. To the remarkable change in the virulence of the pneumococci is attributed the cure of the pneumonia. By the accumulation of these products of secretion the soil in which the microbes develop is modified, after a time. They first give rise to the pneumotoxin, which can be isolated, and later to the presence of another substance, anti-pneumotoxin. Thus, the blood of an immunized animal contains the anti-pneumotoxin, and through it the cure of the pneumococcus infection is brought about. In the blood-serum of patients with fibrinous pneumonia are found both pneumotoxin and anti-pneumotoxin; the former especially during the febrile stage of the disease, the latter after the crisis. Up to that period of the disease it has been forming and accumulating. Normal blood has been shown by experiment to have no effect when injected in equal quantity into a pneumonic patient. This treatment is most serviceable in grave cases, where the organism is on the point of succumbing to the struggle, and where it needs to be sustained by every possible means. The same subject is thoroughly discussed by Lara.³¹

Feb. 25

BRONCHITIS.

In a case of acute fibrinous bronchitis reported by Rohr,²¹⁴ Dec. 15, 1892 the patient awakened suddenly at night with feeling of great oppression in the chest. Severe coughing followed and a large white mass was coughed up, whereupon the discomfort disappeared and the patient slept again. This occurred three times. She then came to the hospital, bringing the white masses, which proved to be casts of bronchial tubes. The attacks became more frequent, and the relief between them was only partial. After six weeks the patient died. Section showed thickening of the mitral and tricuspid valves, hyperæmia of the bronchial tubes, a large infarction in the right lung, and tubercular disease of the left kidney, ureter, and bladder.

Terpine hydrate is recommended by Murrell²² in the treatment of affections of the bronchial and nasal mucous membrane. It is a solid, and has somewhat the appearance of chloral hydrate; its odor, which is slight, resembles that of pure terebene. The

great difficulty in its administration is that it is practically insoluble in water. It is usually said to dissolve in alcohol in the proportion of 1 to 10, although some specimens will not so dissolve. Murrell prescribes it in a solution containing 5 grains (0.32 grammes) to the $\frac{1}{2}$ -ounce (15 grammes), made up with simple elixir and flavored either with *tinctura pruni Virginianæ* and syrup of tar or with *aqua lauro-cerasi*. Terpine not only relieves cough and lessens bronchial secretion, but is a diuretic, and has been used with advantage in neuralgia.

Pneumotomy for putrid bronchitis and cavity of upper lobe of the left lung is reported by Hofmokl¹¹² in a man, aged 25, who had suffered from bronchitis for four years. The expectoration was very profuse and fetid. Physical examination of the lungs revealed dullness, diminished breathing, and subcrepitant râles. Resection of the left third rib was found necessary at the fourth juncture, the sharp-pointed Paquelin being used to reach the cavity. There was an escape of air and fetid sputa. While endeavoring to enlarge the canal with the dressing-forceps a profuse haemorrhage occurred. By immediately tamponing the wound with iodoform gauze and the hypodermatic administration of ergot, the haemorrhage was arrested and the patient experienced no evil effects. The sputum gradually became less and less, and the slight fever which had been present rapidly disappeared. The patient entirely recovered.

The administration of tar in chronic bronchitis is recommended by Murrell²² in the form of tabloids, containing the whole of the constituents of tar, being palatable and speedily disintegrating. One of these tabloids is to be placed in the mouth frequently, or whenever the cough is troublesome, and sucked.

The topical treatment of bronchitis is discussed by Kirk,¹⁰⁵² Mar. who uses direct inhalations from a No. 65 Davidson atomizer, which is connected with an air-tank of about 30 pounds' pressure. This atomizer emits a very fine and copious spray. The tip is introduced into the mouth in the same manner as in the laryngeal and tracheal treatment. The patient is instructed to make as prolonged an aspiration as possible, to pause for a moment, to inhale gently and slowly, and then more rapidly and deeply; during the inspiration the spray is started slowly and then with more or less force, the patient thereby drawing it into his lungs. In correct inhalation one sees the spray drawn into the chest just as a strong

draught will draw smoke into a chimney. The formula found most useful by the author consists of menthol, 1 to 2 per cent.; creasote, 1 per cent.; camphor, $\frac{1}{2}$ to 1 per cent.; eucalyptus, 2 per cent.; pine-needles, 2 per cent.; in albolene or benzoinol. The average quantity to be inhaled is 2 drachms (8 grammes); after which the patients begin to gag and the stomach revolts against more. These 2 drachms (8 grammes) in well-trained persons are absorbed in 8 to 12 inspirations. The results are most striking in the severest cases of chronic bronchitis.

PLEURISY.

The etiology and pathology of pleurisy are carefully studied by Prinz Ferdinand Ludwig³²⁶ in 23 cases. The exudate was serous in 9 cases, with 1 death; sero-purulent in 1 case; purulent in 12 cases, with 5 deaths; sanguino-purulent in 1 case. Of the 9 cases of serous exudate, 2 were caused by pneumococci, 2 by staphylococci, and 5 were free from bacteria. Of these latter, however, 4 were tuberculous. The sero-purulent exudate contained a diplococcus. Of the 12 cases of empyema, 2 were caused by diplococci, 5 by streptococci (2 deaths), 2 by tubercle bacilli (both fatal), 2 by diplococci and streptococci (1 death), and 1 by staphylococci and streptococci. Spontaneous absorption of exudate took place in 5 cases; aspiration alone was sufficient in 3 cases. Resection of the rib was practiced in 10 cases, with a mortality of 20 per cent. The prognosis varies in purity according to the meta-pneumonic primary staphylococci, the primary streptococci, and the bloody empyema, in the order named. The greater number of serous exudates are free from bacteria, but the greater number of those free from bacteria are tuberculous. Some serous exudates remain so, in spite of pus-producing bacteria. The greater number of empyemata are caused by streptococcus pyogenes, but other bacteria may also be causative factors. Infection of the lung-tissue follows a lesion of the lung-tissue, in most cases. An exudate of toxic or mechanical nature must be recognized. In contradistinction to the idea advanced by Prinz Ferdinand, that the exudate in streptococcus pleurisies inevitably becomes purulent, Goldscheider¹¹⁴ reports three such cases where the exudate remained sero-fibrinous throughout the course of the disease, being at no time purulent.

The etiology of pleurisy has been studied by Jakowski ⁵²⁰ _{Nov. 11, 12, '92; Aug. 10} ⁹⁹ in 52 cases, the author concluding that the disease is of bacteriological origin, although the bacteria may not be found in the exudation. He considers the majority of primary, non-tubercular pleurisies as due to the diplococcus of Fraenkel. The most frequent cause aside from these is the streptococcus pyogenes. Serous effusions containing the latter are much more likely to become purulent than those which contain only the diplococcus. The most favorable prognosis is to be given in cases which contain only the Fraenkel diplococcus. The etiology of exudative pleuritis has been carefully studied by Prudden ^{June 24} in 21 cases; the exudate revealed bacteria in only 2, and in these 2 cases, which were associated with acute lobar pneumonia, the pneumococcus was the only organism encountered.

A case of chylous pleurisy is reported by Turney. ⁶ At the necropsy the abdomen was found to contain about 5 ounces (156 grammes) of milky fluid and the right pleura 2 pints (1 litre). In the left pleura there was a pint ($\frac{1}{2}$ litre) of turbid serum with some fat held in suspension. The thoracic duct was dilated in its whole extent, and was blocked at its outlet by thrombosis of the internal jugular and subclavian veins limited to that spot. The liver appeared normal. The general glandular enlargement was due to infiltrations with carcinomatous deposit secondary to scirrhus of the pylorus. The inner surface of the stomach was also covered with secondary nodules. Turney suggests that the thrombosis around the opening of the thoracic duct was due to the lodgment there of a cancerous embolus. In support of this theory he adduces the general disintegration of the growth through the lymphatic system and the difficulty of otherwise explaining the thrombosis.

Parapneumonic pleurisy is described by Lemoine, ³ _{Jan. 13; Apr. 151} who has observed seven cases of pneumonia complicated by pleurisy, both diseases developing simultaneously. Parapneumonic pleurisy generally begins with the pneumonia, or at least follows its appearance very closely. In most cases the effusion is discovered on the second or third day of the illness, develops rapidly, and may disappear as quickly. It is exceptional to see a parapneumonic serous effusion become purulent. In the very rare cases where it does so, it is not due to pneumococci, but to the ordinary micro-organisms of suppuration, streptococci, or staphylococci.

Loculated pleuritic effusion, reported by Hood,^{6 June 17} is clinically important as demonstrating a cause, not usually recognized, of the so-called dry-tapping in pleurisy,—*i.e.*, the entry of the aspirating-needle into a dense septum between loculi. The pleural cavity in Hood's case was occupied by numerous loculi separated from one another by dense fibrous bands, some at least half an inch thick. In the first three punctures the needle had plunged into the dense fibrous septa which divided the loculi. The fourth alone reached fluid, but, unfortunately, only one of the smaller cavities. The anatomical condition of the left chest explained completely the conflicting physical symptoms which had been noted before death, and which might have been accounted for by a new growth or a consolidation of the lung. In fact, many who examined the patient's chest considered the presence of fluid contra-indicated.

Diaphragmatic pleurisy is quite common in the lighter forms, where it may be mistaken for pleurodynia or a tender point of neuralgia. Both sides are affected alike frequently. The determining cause, as in all pleurisies, is a microbial infection. The exudate may be purulent or subfibrinous. The pleurisy may be primary or secondary. The former arises from cold, traumatism, or excessive labor. The secondary form occurs after influenza, typhoid, articular rheumatism, heart disease, Bright's disease, or extends from costo-parietal pleurisy, mediastinal tumors, pulmonary tuberculosis, pneumonias, hepatic abscesses, hydatid cysts, biliary calculus, perihepatitis, cirrhosis, perisplenitis, abscesses and tumors of the kidney, and peritonitis. In women pelvic peritonitis is a frequent cause. A very constant and characteristic sign is the so-called diaphragmatic button, a tender spot two fingers' length from the linea alba at the level of the tenth rib. It can be found even when there is no spontaneous pain. There is also tenderness along the attachment of the diaphragm, and another very tender spot on this line near the spinal column, as well as along the course of the phrenic nerve. The physical signs are: depression of the tenth rib, enlargement of that side of the chest at the same level, decrease of vocal fremitus, and absence of respiratory murmur. Other symptoms are those of ordinary pleurisy.

A rare and interesting case of pleuritic eclampsia is reported by Talamon.^{31 June 121} There had been no suppuration, and the epileptic attack was produced spontaneously without any artificial

irritation of the pleura. The author thinks it reasonable to suppose that the phenomena were due to the sudden entrance into the blood of a toxic substance acting upon the brain and probably the bulb as a convulsive poison. In this particular case the poison would be the toxin of pneumonia. For the production of convulsions we must suppose one of two conditions,—either a special susceptibility of the subject or the entrance into the circulation of an abnormal quantity of poison.

Sudden death in pleurisy, the amount of fluid being very moderate, is reported by Lesueur.⁶ On the eighth day the effusion occupied two-thirds of the pleural cavity. After that it began to diminish, and on the twelfth day respiration sounds could be heard all over the affected side. Getting up without permission, the patient, a woman, was seized with severe pains and a feeling of suffocation. Her lips became blue and the pulse thready. She died in less than four hours. No disease of the heart or lungs could be detected. Lesueur suggests, as the cause of death, arrest of the heart by means of reflex irritation caused by intercostal neuritis, acting upon the inhibitory cardiac apparatus. Another case is reported by Thomson⁶ in which the effusion was considerable, and in which the reporter believes that the heart was unable to longer successfully combat the increased peripheral resistance offered by the diminished lung-area.

Treatment.—The preventive treatment of pleuritic exudation is described by Volland,¹¹⁶ who stringently imposes absolute rest in the recumbent posture on the slightest indication of the formation of pleuritic fluid. If there is a small quantity of fluid, the exudation has a natural tendency to alter its position if the patient is allowed to raise himself in bed. This change causes a gradual but certain compression of the lung in a new locality. While the fluid is changing its position, a negative pressure is exerted on the portion of the lung which has been contiguous. As expansion of the lung cannot at once fill the space produced, blood and lymph exude, thereby increasing the quantity of effusion. The resultant fatigue produces more labored respiration, which also reacts unfavorably on the affected lung. The author keeps his patient in the recumbent position eight days after the temperature has become normal.

Early aspiration is highly recommended by Didama.⁶¹ Dec. 24, '92

When percussion shows the presence of fluid, even if the amount does not appear to be 1 pint ($\frac{1}{4}$ litre), aspiration is performed. A repetition of the operation is scarcely ever needed. Convalescence is rapid, unattended by great prostration, and recovery is complete.

A case of pleurisy complicating labor is reported by Guin.¹ Delivery by long forceps was necessary. The author believed that the pleuritic fluid prevented uterine contractions or rendered their propulsive efforts useless.

ASTHMA.

Schmidt² has made a series of careful observations on the sputum of asthmatics by making sections of balls of sputum hardened in sublimate and salt solutions. As to the mode of the formation of Curschmann's spirals, Schmidt does not agree with the views of Levy, Curschmann, and Pel, but believes the formation of the spirals to be caused by the whirling of the air during long paroxysms of dyspnoea or violent fits of coughing. He has been able to demonstrate the presence of fibrin in the sputum in six out of eight cases of asthma.

Asthma replacing epileptic fits in an idiot is reported by Francis Taylor.³ The pent-up nerve-storm, instead of discharging itself in the customary channel in an epileptic seizure, expended its energy upon the bronchial muscular fibre, giving rise to the protracted asthmatic phenomena. Finally, after many hours, it exhausted itself by way of an orthodox "fit," thus bringing the disturbance to a conclusion.

Kruse⁴ is inclined to ascribe asthma to a morbid condition of the bronchioles themselves, and claims that all treatment based on altering the condition of other supposed sympathetic organs has failed in the majority of cases. The author extols the inhalation of sea-air, a therapeutic factor on which insufficient stress is laid at present, the good effect of which is due to the density of the air, the higher degree of moisture, and the absence of dust. Marked amelioration from sea-air has also been observed by Thomas.⁵

Paraldehyde has been successful in the hands of Mackie⁶, in the treatment of many cases of nervous asthma, used in 30-grain (2 grammes) doses hourly until improvement is noted. One dose usually suffices, and more than three were not required.

Bullard,⁴⁴ *Dec. 1912* calls attention to the dangers from the use of smoke-powders for the relief of asthma. Patients should be cautioned against the dangers of overindulgence.

Strychnine subcutaneously, in $\frac{1}{30}$, $\frac{1}{20}$, and $\frac{1}{10}$ grain (0.002, 0.003, 0.006 grammie) doses, given in the evening, with possibly $\frac{1}{400}$ to $\frac{1}{600}$ grain (0.00016 to 0.00012 grammie) atropia, is highly recommended by Mays.⁴⁰ Peroxide of hydrogen by means of spray inhalations is advised by Warren.²⁰² *June 26* Several ounces of the fluid being put in the atomizer, the spray is directed over the patient, the operator standing at some distance. It is used in that period of dyspnoea where the difficulty of breathing does not amount to an actual paroxysm. The author thinks the relief induced is due to a superoxygenation of the inspired air. The saturation of the air with moisture has also a beneficial effect. During the paroxysm the author uses the iodide of ethyl by inhalation, a few drops on a handkerchief.

Torstensson³⁶ *Jan.* formulated his conclusions before the Fifth Swedish Congress, in the treatment of four hundred cases. He found asthma to be connected with an inactive state of the skin, and was able to cure several slight cases by attention to this structure. He found, in every one affected with asthma, the superior turbinate, and sometimes also the inferior turbinate, so swollen as to come near the septum. To remove the pressure or irritation, chromic acid is applied on probes provided with hollow balls at the end. Superfluous acid is removed by cotton-wool, after which the nose is tamponed for several hours. Between cauterization antiseptic sprays are used. Generally five or six cauterizations effect a cure.

A case of asthma successfully treated by hypnotic suggestion is reported by Creed,²⁰⁷ *June 15* every other measure having been tried. The patient was so much relieved that when removed from his medical attendant a written order from Creed, "to sleep when he reads it, and to awake after five minutes, breathing freely," never failed to produce the desired effect.

EMPHYSEMA.

The relation of emphysema to pulmonary tuberculosis is divided by Potain¹⁰⁸ *Jan. 15, 1912* under three heads: 1. Where the empyema is primary and the pulmonary tuberculosis is secondary.

2. Where the pulmonary tuberculosis is primary and the emphysema is secondary. 3. Where the two diseases are developed at the same time. In cases of general emphysema the treatment should be addressed to that rather than to the tuberculosis. If the tuberculosis is chronic, the emphysema seems to rather retard its development. Chiari⁸⁸,_{v.18,3, Mar. 15}¹³ has found in septic emphysema a bacillus identical with the bacillus *coli commune*.

In twenty-four cases studied by Prudden¹,_{Janss 24} the exudate revealed bacteria in all. In simple emphysema the organism most commonly present (in 7 out of 8) was the streptococcus pyogenes. In a case of a metapneumonic emphysema, the organism most commonly present (in 9 cases out of 11) was the micrococcus lanceolatus (pneumococcus). In 4 cases of emphysema, various forms of bacteria, mostly bacilli, were found. Only once was the staphylococcus pyogenes aureus present. In one case of tubercular emphysema tubercle bacilli were alone present. The mortality in the cases of streptococcus emphysema was much higher than in those associated with the pneumococcus, 5 out of 8 having died when streptococcus was present, while only 2 out of 8 died where the pneumococcus was found. In both these fatal cases there was an acute inflammatory heart complication.

EMPYEMA.

Drainage apparatus is described by Hutton⁹,_{Apr. 15} having the following advantages: It contains a valve which prevents the air from getting back into the pleural cavity. This result is diminished pressure on the lung, which favors its expansion. The discharge is easily dealt with, as it is received into a bottle or into a separate dressing, obviating the inconvenience of frequently dressing the wound. The patient is not confined to his bed, but is allowed to go about having the bottle in his pocket to receive the discharge. The apparatus is simple and cheap, consisting of a rubber tube about one inch long with a lumen of about two-fifths of an inch. This is provided with a pliable rubber flange six inches long, four inches broad, and one-eighth of an inch thick. A glass tube is fitted into the rubber one, extending not only through the chest-wall, but projecting about one inch outward. Over the projecting glass tube is slipped a rubber tube one foot in length, and to the end of this the valve is attached.

PNEUMOTHORAX.

Pneumothorax in childhood is studied by Cnopf, ³⁴ _{Oct. 7, 8; Mar. 18} who remarks upon its rarity at this age, as shown by the statistics of Lenz and Steffen. Cnopf points out that diphtheria must be reckoned as one of the chief causes in childhood, either through the vascular engorgement and apoplexy, leading to softening and rupture, or, by overdistension of parts of the lung with air, leading to alveolar rupture. A case of localized pyopneumothorax is reported by Osler, ⁷⁶⁴ _{Oct. 3, Nov., '92} notable because of its origin and duration. It was probably an empyema following pneumonia, with the common sequence of perforation into the lung, causing pneumothorax. Recovery from pneumothorax is reported by Klemperer. ⁶⁹ _{Jan. 22} The patient, a costermonger, was the subject of an obstinate laryngitis as a result of his shrill cries. While walking he felt a stitch in his left side and fell down unconscious. When brought into the hospital, dyspnoea and cyanosis were both very marked. The right side of the thorax was moving at the rate of 72 per minute, while the left side was motionless and all the typical signs of pneumothorax were detected. There was no history of phthisis, nor any physical signs of it, and it was supposed that the street-crying had produced emphysema and that the rupture of an emphysematous lung had produced what Leyden calls "a simple pneumothorax." He left the hospital quite well three weeks after his admission.

MISCELLANEOUS.

A pulmonary abscess communicating with the mediastinum is reported by Morrison, ² _{May 20} occurring in a woman at the time of confinement. A mediastinal growth implicating the heart and opening into the oesophagus and aorta is reported by White. ⁶ _{May 6} The patient showed, during life, the usual signs of mediastinal growth and died suddenly, bringing up much blood from the mouth. Autopsy showed the superior and left part of the mediastinum to be occupied by a round-celled sarcoma, which was gangrenous in parts. It involved the greater part of the left pleura and pericardium, causing both pleurisy and pericarditis. There are two similar specimens in St. Thomas's Hospital.

Infusoria in the sputum from cases of *gangrene of the lung* is discussed by Streng, ¹ _{Oct. 2, '92} who discovered specimens of the monas

lens and the cereomonas in plug-shaped masses of the expectoration. He describes them as oval, apparently structureless cells, about the size of a red blood-corpuscle, or smaller, possessed of long flagellæ, by means of which they propelled themselves about the field of the microscope, at the same time exciting by their movements currents in the fluid. A case of diffuse gangrene of the left lung, due to the presence in the bronchus of a temporary molar tooth, which had accidentally become dislodged while the patient was under an anaesthetic, is reported by Monro.

²¹³
_{Feb.-Apr.}

Primary cancer of the pleura was observed by Harris,⁵¹ who showed microscopical specimens from two cases. One growth presented the characters of a squamous-celled epithelioma, the other of the cylinder-cell type. The author said that although he felt that recent embryological research, and much of our pathological knowledge, might be against the view of primary epithelial malignant tumors arising in tissues developed from the mesoblast, he held that occasionally, though rarely, such tissues did give rise to growths of this character. A case of primary carcinoma of the pleura is also reported by Hebb.⁶ Examination showed complete dullness, with absence of movement and respiratory sounds over the right thorax, without contraction. Twenty-nine ounces (900 grammes) of a brownish-red fluid were drawn off, in which one large epithelioid cell showing a cancer body was observed. At the post-mortem the right pleura was found to be much thickened, some brownish-red, turbid fluid with soft clot being in the sac. The lung contained an irregular white deposit about the size of an almond, which was connected with the visceral pleura in front. The parietal pleura was everywhere greatly thickened, being an inch thick in places. On section it was white, very tough, and resembled dense, fibrous tissue. The right half of the diaphragm was infiltrated by the growth. There was some infiltration of the capsule and upper surface of the right lobe of the liver, numerous secondary deposits over the peritoneum and left pleura, a few of the lymphatic glands of the mediastinum being infiltrated. The pleura, microscopically, was found to be composed of fibrous tissue interrupted by channels of epithelial cells. The pleura was partly primarily affected, and the secondary growths were extremely small and limited to the peritoneum, left pleura, and a few mediastinal glands.

A case of primary carcinoma of the lung is reported by Rothmann, ⁶⁹ Aug. 31. A haemorrhage of considerable size continued almost uninterruptedly for three-fourths of a year,—an unusual condition in this disease. A case of primary cancer of the lung complicated with secondary cancer of the liver is reported by McCall Anderson, ²¹³ Feb., Apr. who also observed left hemiplegia complicating a tumor of the root of the lung. A case with secondary deposits in the liver, brain, and scapula is reported by Simon. ³² Aug.

A *dermoid cyst* of the lung was seen by Kretz. ²² July 19. Post-mortem revealed a cyst the size of an apple in the upper lobe of the left lung. It consisted of a firm bag containing an oily mass of *débris* in which were situated a number of hairs ten or fifteen centimetres in length. This dermoid growth appears to have sprung from the mediastinum of the lung, and in its progress had perforated the bronchus in three different place. He considered the present cyst a recent one, the ectodermal cells having been diffused in little more than thirty days. He could find but two such cases mentioned in the whole range of German literature. These could be easily diagnosed *in vivo*, owing to the sputum containing a large quantity of hair, besides the tuberculous matter.

A new method of *intra-organic thoracic auscultation* has been discovered by B. W. Richardson, ²² July 19 who found, on passing a sound through the cesophagus, that when the end of the instrument was connected with a stethoscope he could hear different murmurs. He instituted a number of observations, and decided that this method was of value in certain cases. When the sound passes through an œsophageal stricture, a loud friction sound is heard, while when it enters the stomach a shrill sound is noticed. The heart-tones are distinctly heard and differentiated, although the respiratory murmurs cannot be auscultated. The murmurs are not as resonant as in ordinary auscultation. The importance of this may be recognized in thoracic aneurisms, heart-failure, and in the differentiation of pericardial and pleural friction murmurs. The sound used was the ordinary elastic stomach-tube, with two lateral openings. The sound must be shifted until it is opposite the point to be auscultated.

DISEASES OF THE HEART AND BLOOD-VESSELS.

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AND

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BOSTON.

GENERAL CONSIDERATIONS.

Functions of the Cardiac Ganglia.—About two years ago, His and Romberg (see ANNUAL of 1891, vol. i, B-14) found, as a result of embryological studies, that the cardiac ganglia are only sensory centres which grow from the vagus and sympathetic into the heart. Earlier researches had proved that the heart-muscle of the frog possessed an automatic activity. In regard to the heart of warm-blooded animals, Krehl and Romberg^{15 July} have now demonstrated that the heart-muscle is in a condition to contract rhythmically without nervous influence. The experiments were conducted on the hearts of rabbits.

The following are the most important conclusions at which the authors arrived: 1. The mammalian heart-muscle possesses automatic powers which make it capable of rhythmical pulsation, 2. The rhythmical pulsation is only the response to a stimulus which is occasioned by the blood circulating in the heart-cavities or vessels. 3. The automatic powers are of varying strength in different parts of the heart. They diminish from the point of entrance of the great veins toward the ventricles. It is, as yet, doubtful whether the latter, under ordinary conditions of the circulation, are capable of automatic activity. 4. The frequency of the heart-beat depends on the muscular strength at the points of entrance of the large veins, naturally only so long as external influences (vagus acceleration, action, etc.) do not interfere. The pulsation of the remaining portion of the heart is not automatic, but acquired. 5. The propagation of the contraction from the auricles to the ventricles results through muscular fibres, hitherto

unknown, but now demonstrated by His, which connect the auricles and ventricles with one another. 6. The alternating rhythmical contraction of the auricles and ventricles depends on the arrangement and condition of these fibres; in what manner, in individual instances, has yet to be found out. 7. The cardiac ganglia are not automatic centres. They do not take part in the conduction of the stimulation from the auricles to the ventricles, and in the maintenance of the alternating rhythm of both portions of the heart. Possibly they secure, to some extent, the regularity of the heart-beat; not directly, but only in a reflex manner. 8. The vagus and accelerator fibres reach the heart through the auricular reticulum. 9. The influence of the vagus can be conducted through the muscular and also through the nervous extension to the ventricle. In the latter case the slowing and arrest, respectively, of the ventricle would be independent of the auricle. 10. It is not yet established that ganglia are inclosed in the course of the inhibitory vagus or accelerator fibres. 11. The ventricles, like the whole heart, when cut off from the ganglia, overcome undue distension and increased resistance. In short, the ganglia have no share in adapting the heart's power to such contingencies. 12. Muscarine and atropine both act in a typical manner on sections of the heart deprived of ganglionic influences.

From the researches of these authors it is, therefore, proved that the cardiac ganglia do not possess a large share in the functions which have been hitherto attributed to them. They are to be regarded as sensory organs, although their activity in individual cases is still somewhat obscure. The cardiac muscle appears as an automatic motor of the circulation, which adapts itself according to varying demands on its self-acting powers, without any nervous influence—as, for instance, in compensation.

Aberrant Chordæ Tendineæ.—Huchard No. 9, '92; Mar. 18; June 5, 420 writes an interesting article on the subject of aberrant chordæ tendineæ, *i.e.*, those which, instead of running from a columnæ carnea to be inserted into the valve, extend from one point to another of the ventricular wall. When these tendons are long and stretch directly across the blood-current in the aortic area, their existence may be detected during life by means of certain, more or less musical murmurs, by the point of maximum intensity of these murmurs, and by the vibratory thrill perceived on palpation. The presence

of aberrant tendons in the heart is, however, not always attended by recognizable physical phenomena. For the existence of these it is essential that the tendon be interposed in the blood-current, and that the ventricle act vigorously.

Huchard reports five cases in which the diagnosis made during life was confirmed at the autopsy. In one of these cases the wandering cord was found to have occasioned coagulation about it. Generally these formations are congenital; occasionally they seem to be of pathological origin, chiefly by sclerous atrophy of the trabeculae. They have not been observed in the right chambers of the heart.

Sounds in the Head.—A female patient of Teleky's,²² aged 58, had for two years a buzzing noise in the head, which gradually increased to a rushing, blowing sound that became intolerable. The heart-sounds were normal, and the organ was not enlarged; the arteries were soft and showed no abnormal pulsation. Auscultation over the head revealed a buzzing sound synchronous with the systole and loudest over the left ear. The sound appeared to originate in the internal carotid artery. Hutchinson had a similar case. A woman, aged 45, had disturbed vision, paralysis of the abducens and oculomotor, and an aneurism was found in the carotid artery. Eiselsberg showed another case where a man had fallen from a scaffold and compression of the carotid was found.

Etiology of Chronic Heart Affections.—Schott⁴,_{23,24} has prepared a table showing the condition of 750 patients who came under his observation, 245 suffering from organic endocardial disease and 505 affected with neuro-muscular conditions of the heart. Heredity appeared to him an unexpectedly important etiological factor. 212 patients stating that one or more relatives were similarly affected; and, among 245 patients with valvular disease, the same affection was 58 times recorded among relations in the direct ascending or descending line. The coincidence in families the author attributes not so much to a rheumatic tendency as to the heart being a *locus minoris resistentia*, readily affected by severe maladies; and, among hereditary causes, he also enumerates obesity, arthritis, and arterio-sclerosis. In the 245 cases of valvular disease acute rheumatism appeared to be the cause in more than half the patients, the other factors being, in order of frequency,

arterio-sclerosis, scarlatina, typhoid, arthritic processes, influenza, diphtheria, measles, etc, and in one case there could be no doubt as to gonorrhœal rheumatism producing valvular disease. In the remaining cases there were 2 of syphilis, 5 of diabetes, icterus, and Graves's disease, and in 9 patients a high degree of kypho-scoliosis was associated with a systolic murmur, which Schott attributes to mechanical causes. A larger variety presents itself among the second group, comprising patients with neuro-muscular disease, namely, as regards the muscular tissues,—fatty disease, total or partial dilatation, and myocarditis; and as regards the nervous mechanism,—motor and sensory disturbances and the results of weakened nerve-force. In this group of 505 patients heredity, as would be expected, figures even more remarkably than in the former. No fewer than 140 cases resulted from emotional influence, protracted or sudden, and mental overexertion, while 68 resulted from physical overwork, including such excesses as mountaineering, running during very hot weather, rowing, cycling, and dancing. Febrile diseases were productive of 132 cases, and in 108 patients chlorosis or anaemia existed. Abuse of alcohol, tobacco, tea, and coffee was the cause of functional and muscular disease in 101, tobacco even producing permanent degenerative changes,—and to this class may be added excesses in food. On the other hand, deficient nutrition, during puberty or during attempts at treating obesity, supplied 25 cases. The remaining instances were the results of profuse haemorrhage (19); constitutional diseases, especially arterio-sclerosis; frequent causes also being gastric disturbances, pulmonary affections, aneurisms, nervous disease, and sexual excesses (23). Many drugs, when long continued, sudden changes of temperature, and even high altitudes (8) and traumatism appear as exciting causes.

Heart Disease due to Bicycling.—Edmund Cautley^{July 15} records the case of a clerk, aged 34, who had the physical signs of aortic regurgitation, due probably to partial rupture of one of the aortic valves. This was the result of strain produced by riding a bicycle against time, which he had practiced for five years. Such results are most likely to occur in the class of men who live sedentary lives during the week, as clerks, and attempt to gain health and strength by overviolent exertion on Saturdays and Sundays.

SUDDEN DEATH DUE TO THE HEART.

In discussing this subject W. T. Councilman⁹⁹ divides the cases of sudden death into two classes: first, conditions arising within the heart which render the circulation of the blood through it impossible; and, second, those conditions coming from the heart which interfere with its function, no impediment being given to the circulation of the blood through the heart.

To the first class belong the formation of thrombi within the heart, of such a size as to obstruct the passage of blood,—a very rare condition. The most common place for the formation of such thrombi is within the auricular appendages. The smaller thrombi may, of course, cause sudden death, when carried from the heart, by occluding arteries going to parts essential to life. The most extensive formation of thrombi is usually associated with chronic endocarditis and stenosis of the mitral valve. Mural thrombi may be formed at the opening of the heart, and may be sufficiently extensive to prevent the entry or the exit of blood. A specimen was shown by the writer in which a thrombus terminating in a large globular mass had formed in the sinus of Valsalva, behind the anterior segment of the aortic valve. Probably, during life, this had floated freely in the aorta. At the autopsy it was found below the valves, within the ventricle. It is possible that it may have been forced into the ventricle at the close of the systole, and then, on the next contraction of the ventricle, may have been wedged into the orifice by presenting a longer diameter, thus closing the orifice and instantly stopping the circulation. In looking over the literature of heart-thrombi the writer was unable to find a similar case. Of importance in this connection are the so-called free thrombi in the heart. These are always round, their form being due to their motion within the auricle, and, probably, to their increase in size by the continuous addition of new masses of fibrin. They are necessarily always associated with stenosis of the mitral valve, for with a valve of normal width the masses separated from the mural thrombi would pass through the ventricle. That they may become a cause of sudden death, by closing as a ball-valve the narrow auriculo-ventricular opening, appears evident from the case of Hertz, and from a case observed by the writer at the Johns Hopkins Hospital.

The cessation of the circulation may also be due to the stoppage

of emboli in the heart. In this case, according to Terrillon, the heart does not cease instantly, but its beats become gradually smaller and scarcely perceptible, and a condition of extreme cyanosis, followed by death, results. In such a condition the embolus must be an extremely large one, and it is probably caught in the ventricle, and, from the continuous addition of thrombi to it, it may occlude the orifice of the pulmonary artery. These seem to be the only conditions which interfere with the circulation of the blood through the heart by obstructing its orifices.

The second class of cases, in which the mechanism of the heart itself breaks down, is subdivided into those in which the pathological condition is seated in the muscular substance of the heart or in the valves. Among the latter are those cases of sudden rupture of a valve, generally the aortic, due to sudden strain, and this may take place in a perfectly normal individual. The writer saw one case in which sudden rupture of the chordæ tendineæ of the mitral valve was sufficient to instantly stop a diseased and hypertrophied heart. It is difficult to see how such an accident could happen in a normal heart, and even should it take place it would probably not result in sudden death.

A very much larger number of cases of sudden death are due to conditions affecting the integrity of the myocardium and its power of contraction. These pathological conditions are in the main or entirely to be referred to diseased conditions of the coronary arteries. Cases in which the trouble lies in the mitral orifice, whether stenosis or regurgitation, or both, rarely or never die suddenly. Sudden death, though not common, may take place in cases of stenosis of the aortic orifice. In these cases the fatal result is more often due to an extension of arterio-sclerosis from the aorta to the coronary arteries and the changes in the myocardium following it than to the aortic stenosis in itself. The coronary arteries are among the arteries most liable to disease. They may be occluded by thrombosis or embolism, or have their lumen narrowed or occluded by arterio-sclerosis and atheroma. The left coronary artery is more often affected than the right, and the descending branch of the left coronary more frequently than any other single branch. The condition known as fibrous or chronic myocarditis is a result of alterations in the coronary arteries. Although spoken of as myocarditis, it probably is not an inflam-

mation, but the fibrous tissue simply takes the place of the previously degenerated muscular tissue which has been absorbed. The process is one which is rarely found in the right ventricle, and is usually confined to the left side of the heart, where it affects the apex of the ventricle and the papillary muscles. Most authors agree that fibrous myocarditis is exclusively due to the disease of the coronary arteries, but the writer mentions a case, observed by himself, in which an extensive fibrous myocarditis was the result of an extension of pericardial inflammation in a syphilitic subject, the coronary arteries not being obstructed.

Although this formation of fibrous tissue is essentially conservative in its action, supplying a firmer tissue than the degenerated muscle, it is infinitely less resistant than the normal tissue of the heart. It gradually gives way before the pressure in the ventricle, and is the cause of aneurism of the heart. Rupture of the heart, leading to sudden death in a large percentage of the cases, may take place through the walls of such an aneurism. It may be regarded as certain that rupture, even under the greatest sudden increase in pressure, never takes place in a normal heart. The connection between rupture of the heart and disease of the coronary arteries was first recognized by Barth, and since then has been noted in all cases in which the arteries were examined. The pathological conditions of the myocardium which may lead to heart-rupture are: fibrous myocarditis with or without aneurism formation, circumscribed fatty degeneration, necrosis, and fatty infarction. The only condition of the heart not connected with disease of the coronary arteries, which may be followed by rupture, is fatty infiltration. In the earlier literature several cases of this have been reported, but since the condition of the coronary arteries has received careful attention there has been no report of this. To both traumatic and spontaneous rupture of the heart the male sex is more disposed than the female. In the traumatic rupture, the greater frequency in males may be explained by their greater exposure to danger; and in the spontaneous rupture, to the fact that men are more disposed to lesions of the vessels than women. By far the most common seat of rupture is in the left ventricle, and next, in order of frequency, in the right ventricle, right auricle, left auricle, and very rarely in the intra-ventricular septum. It is most apt to be found in the later years of life, owing to the greater

frequency of vascular disease as age advances. The rupture may be direct, or by burrowing through the wall of the heart and making a fistulous passage. It may occur when the patient is perfectly quiet and free from excitement. Death is not always instantaneous, as the rupture may occur by degrees. In several cases, the beginning of the rupture was marked by fainting, and death followed several hours afterward. In all of these cases death is not due to the haemorrhage, as the amount of blood found within the pericardium is never sufficient to have been the cause, but to an increased pressure within the pericardium, preventing the entry of venous blood into the heart, and so stopping the circulation. Rupture of the heart does not seem to follow ulcerative endocarditis even when the ulceration is extensive. In rare cases the rupture may be due to the presence of new formations in the heart or to parasites, as the echinococcus cyst.

Although a circumscribed fatty degeneration of the heart, due to coronary disease may lead to rupture, this does not take place in the general fatty degeneration of the muscle, which comes on in the acute infectious diseases, probably because in these cases there is a diminution in the force of cardiac contraction and of the intra-ventricular pressure.

A much greater number of cases of sudden death is due to disease of the coronary arteries without rupture of the heart. It is probable that most of the cases of sudden death without apparent cause, which have been reported, were due to diseased conditions of the coronary arteries which were overlooked at the autopsy. Death from this cause may be the most sudden of any. An individual often falls as if struck by lightning. Rare cases are seen in which there is considerable disease of the arteries without any macroscopic evidence of degeneration of the myocardium. Microscopic examination in such cases will usually show rather diffuse hyaline degeneration with slight connective-tissue increase.

We can easily understand that the instant closure of a large branch of the coronary by an embolus should be followed by the instant cessation of the heart's function. But it is more difficult to understand the sudden stopping of the heart, without any previous symptoms, in those cases in which the closure of the vessel takes place gradually. Sudden death is more frequently associated

with disease of the descending branch of the left coronary than of any other.

Alfred L. Loomis⁴⁵¹ reports a series of cases of sudden and fatal heart-failure, and endeavors to determine the underlying conditions which are usually present in such cases. He includes all heart-failures in three classes: 1. Those in which the heart has for a long time been called upon to perform an abnormal amount of work, as in valvular and arterial disease. 2. Those in which obstructive changes in the coronary vessels markedly diminish the nutritive supply of the cardiac muscle. 3. Those in which toxic influences act directly upon the nutrition of the cardiac muscle, or so interfere with the cardiac-nerve supply as to lessen cardiac resistance.

Cases included in the first class are the most numerous and most easily recognized. There is always a limit to the heart compensation in valvular diseases and in general arterial fibrosis; and the danger-point should be carefully estimated whenever this class of subjects is called upon to struggle with an intercurrent disease, or to resist sudden and violent heart-strain. Not only must the resisting power of the heart be carefully estimated, but the existence or non-existence of morbid changes in other organs be accurately determined; the aim should be not so much to treat the heart-failure as to prevent its occurrence.

Cases of the second class are far more difficult of recognition. The writer is, however, convinced, from a careful study of such cases, that in fibroid disease of the heart it is possible to make an early diagnosis. The diagnostic symptoms of this condition are briefly stated as follows: A feeble, rapid, irregular pulse; weak, but sharp heart-sounds, the first sound closely resembling the second in tone and duration,—having a close resemblance to fetal heart-sounds. Advanced cases are subject to frequent attacks of extreme praecordial anguish, with a sense of impending suffocation; the countenance assumes a death-like pallor, the extremities are cold, and there is a tendency to syncope. The intensity of these symptoms vary in different individuals. In some, the only symptoms which will be noticed by the patient for a long time will be a feeble, fluttering, irregular, and intermittent heart-action; now and then the patient will complain of epigastric pulsation and temporary attacks of suffocation, and he will soon learn to avoid any pro-

longed physical exertion. Usually, when these cases have reached the condition in which severe attacks of praecordial anguish are of frequent occurrence, the end is not far distant. In making a diagnosis of cardiac fibrosis, therefore, one must determine by the symptoms and physical signs that the heart is chronically weak, and that there are no valvular or other lesions to account for this weakness; and if we find that the administration of digitalis and other heart-tonics not only fails to restore the cardiac rhythm, but, on the contrary, makes its action more irregular and intermitting, increasing rather than relieving the cardiac apnoea, we may be quite sure that cardiac fibrosis exists. The danger of sudden heart-failure in this class of subjects is so great that it renders all acute diseases dangerous and contra-indicates all severe heart-strain. For, whenever the point of cardiac resistance is once passed, we can never hope to fully re-establish it. Post-mortem studies teach that fatty degeneration of the heart is usually associated with obstructive changes in the aorta and at the origin of the coronary arteries, while, as I have already stated, fibroid changes are usually associated with obstructive changes in the coronary arterioles. Although the danger of sudden heart-failure is very great in fatty hearts, it is by no means as frequently met with at the autopsy-table as the fibroid heart.

Those cases included in the third class are often difficult of explanation, for we are unable to determine always whether toxic influences diminish heart-resistance through its nerve-supply, or by their direct action upon the nutrition of the cardiac muscle. An alcoholic heart, for instance, loses its contractile and resisting power both through morbid changes in its nerve-ganglia and in its muscle-fibres. In typhoid fever muscle changes are evidently the cause of the heart-enfeeblement, while in diphtheria disturbances in innervation cause the heart-insufficiency.

Clinical observation teaches that some chronic and many acute infections so diminish heart-power that sudden failure occurs in hearts that, previous to this infection, were of normal integrity. It then becomes of the utmost importance, in all toxic conditions, to watch for the first indications of cardiac weakness. A rule, which for a long time has governed the writer in all toxic conditions, is, not to wait for signs of commencing heart-failure, but to begin the administration of alcohol, strychnine, and other heart-

tonics early, and thus, if possible, save his patients from fatal heart-failure. The term "heart-failure" is very misleading and should be abandoned, as, in most instances, it does not express the pathological state.

ENDOCARDITIS.

Hanot¹⁷,_{Aug} recognizes three forms of tubercular endocarditis: the caseous, the granular, and the ulcerative. The second is the most frequent and the last is quite rare. The bacillus of Koch has been found only occasionally. The author reports four cases of pulmonary tuberculosis in which valvular lesions were present. In one of these an unknown bacillus was found in the valvular lesions, but in the other three cases no micro-organisms at all were discovered. In these sterile cases the writer claims that the endocardial lesions were produced by toxins secreted either by the tubercle bacillus or by some other pathogenic microbe associated with this bacillus.

Leyden, of Berlin,²² _{Aug 16} reports a fatal case of malignant endocarditis associated with gonorrhœa and epididymitis. The case was of especial interest on account of the etiology. Assuming a connection between the two diseases, the question arose, In what way was the endocarditis produced? There were two possible ways: the parasite of gonorrhœa itself might furnish the cause of the endocarditis, or sepsis might develop during the course of gonorrhœa and septic cocci be deposited on the valves. In favor of the latter view was the fact that streptococci had been found on the valves in some cases. Dissemination of the gonococcus by the circulation had only been proved in a very limited number of cases. The author had succeeded in demonstrating the presence of gonococci in the deposits on the aorta and mitral valve.

In the discussion which followed this paper, G. Lewin denied the diagnostic value of the gonococcus, and said that inoculation experiments were not convincing. Casper admitted, from the facts stated, the extraordinary difficulty of distinguishing the gonococcus from other bacilli, but he would by no means doubt its diagnostic value. Fürbringer believed in the diagnostic value of the gonococcus, and declared that the relation of the gonococcus to gonorrhœa was identical with that of the tubercle bacillus to tuberculosis.

Le Gendre and Beaussenat, of Paris,¹⁴ _{Aug 9} report a case of acute

rheumatism in which, during convalescence, a small pulsating tumor appeared in the course of the right brachial artery. The tumor rapidly enlarged and finally ruptured through the skin. The haemorrhage was arrested, but the patient died in a few hours. The post-mortem examination showed that the aneurism resulted from an infectious arteritis, caused by streptococci, and that this process was secondary to an ulcerative endocarditis of the mitral valve, in which similar cocci were present.

W. T. Howard, Jr.,⁷⁶¹ *Apr.* reports the case of a laborer, aged 44, who was sick for seventeen days with fever; pain in the head, abdomen, and limbs; nausea, vomiting, and diarrhoea. The heart became very weak, and he died in collapse. The post-mortem examination showed an irregular thrombus-mass on the upper aspect of the mitral valve. On the under surface of the valve were several small ulcerated surfaces. There were some small vegetations on the aortic valve. Infarctions were found in the spleen and kidneys. Cover-slip preparations made from the thrombus-mass on the mitral valve, and from the spleen and kidneys, all showed the presence of a bacillus with all the morphological characters of the bacillus diphtheriae. This bacillus was the only organism present. The culture method showed the same appearances as the bacillus diphtheriae, but inoculation failed to kill animals.

Jaccoud¹⁰⁰ *Apr. 10* distinguishes three forms of infectious endocarditis, according to the method of development of the disease. 1. The classical form, beginning suddenly and running a rapid course. 2. The second form is less sudden, less acute. Prodromata continue for six or seven days. At first the feverish periods are intermittent. Except in rare cases of early stethoscopic signs, the diagnosis is very difficult. We must distinguish it from typhoid fever, from malaria, of which the chills are quite similar, and from rheumatism on account of the vague pains in the limbs. 3. In the third form the diagnosis is still more difficult. For five or six weeks there are intermittent febrile periods. There are three or four days of fever, then the patient is better, then the fever returns. This form especially is mistaken for malaria, and the result of treatment by quinine confirms the mistaken diagnosis, as the remission is attributed to the effect of quinine. Still the onset of the disease is slower than that of typhoid fever or malaria. In general, the mode of invasion and of evolution are somewhat sim-

ilar in each of the forms of endocarditis. If it begin rapidly, it is apt to run a rapid course. There are, however, numerous exceptions. It may begin with intermittent febrile attacks, and then the fever may become continuous. The relation between the form of the disease and the infectious agent is still more uncertain. For some time the author has thought there was some general relation. Pneumococci and streptococci seemed to produce the continuous fever type and the continuous paroxysmal type. Pyogenic microbes seemed to produce the intermittent fever variety. There are, however, numerous exceptions. The duration of the disease is longer than was at first supposed. The writer has seen cases of ninety and one hundred and twenty days' duration, and others report still longer cases. Stethoscopic signs always appear, sooner or later.

For treatment a milk diet is recommended, as in all infectious diseases. Large doses of alcohol are particularly useful. Quinine is of no use. Salicylic acid is, in this disease, a very powerful antipyretic and antiseptic. In the grave form of the disease large doses are recommended, as 2 grammes ($\frac{1}{2}$ drachm) in a robust patient or 1.50 grammes (23 grains) in one not so strong. These large doses are maintained for two, three, or four days, then the dose is diminished to 0.50 gramme (7 $\frac{1}{4}$ grains). In case of a recrudescence of fever, the larger doses are again given for three or four days. The union of these three agents gives good results, as was shown in a case referred to by the writer, in which a severe, protracted form of the disease ended in recovery.

Osler¹⁵ describes two cases of chronic intermittent fever of endocarditis in which the disease was prolonged to ten months in one instance and eleven in the other. The clinical features of these two cases may thus be summarized: 1. Daily intermittent pyrexia for many months, the temperature rising to 102.5° F. (39.3° C.) and 104° F. (40° C.), occasionally preceded by a distinct rigor, more commonly by feelings of slight chilliness. Following the pyrexia there was more or less sweating. 2. Progressive failure of strength, with varying intervals of improvement. 3. Physical signs of cardiac disease, in the cases here reported, were an apex systolic murmur and hypertrophy of the left heart. 4. Development toward the close of the embolic symptoms more usually associated with ulcerative endocarditis and cutaneous ecchy-

mosis. The anatomical condition in both cases was the same, namely, large, vegetative outgrowths on the mitral valve. The diagnosis of these protracted cases is often very difficult, and not unnaturally they are mistaken at the outset for malarial fever, particularly when daily chills occur. In other instances the disease is at first thought to be typhoid fever.

MYOCARDITIS.

The subject of secondary lesions of gonorrhœa, which is still very obscure, is reviewed by W. T. Councilman,⁵ and a careful report of a case is presented. It is agreed by all, or nearly all, who have studied the disease, that the gonococcus is found in the discharge from the urethra in all cases of acute gonorrhœa. A review of the literature shows that there are a number of varying opinions as to the pathogenesis of the secondary gonorrhœal affections, some believing that they are due to a specific infection with gonococci, while others believe that they are due to an accidental infection with other organisms which enter the tissues from the local lesions in the urethra. The case reported by the author is of much interest not only on account of the unusual character of the lesions, but from the opportunity which was given for a close histological study of the acute process in the urethra and elsewhere. The patient was a man who entered the Boston City Hospital four weeks after the beginning of the gonorrhœal discharge. Swelling and pain were noticed in both knees and various other joints. There was persistent pain in the chest and a slight increase in cardiac dullness, but no murmur or friction-sound.

On the ninth day after admission to the hospital he suddenly cried out as if in pain and died almost immediately. The temperature had never exceeded $99\frac{1}{2}$ ° F. (37.5° C.) and the pulse kept under 110. At the post-mortem examination the pericardium was found enormously distended with an haemorrhagic exudation in which there were large masses of clot. The myocardium of the left ventricle was firm and of a peculiar, pale, waxy color, somewhat resembling amyloid. Toward the endocardium, especially about the base of the papillary muscles, the tissue had a grayish, translucent, gelatinous appearance. This extended, in places, into the tissue of the myocardium for a considerable distance, and was especially marked toward the apex of the ventricle. This pallor

and translucent appearance was, in some places, associated with marked haemorrhagic infiltration. The condition of the myocardium was confined almost entirely to the left ventricle. On the anterior surface of the left auricle there was an area of two by two and one-half centimetres, where the muscular tissue was substituted by a pale, opaque tissue, the centre of which was soft and almost broken down. Both knee-joints contained a purulent fluid, and the neighboring muscles showed a diffuse, purulent infiltration. The urethral mucous membrane was thickened, softened, and ulcerated. The seminal ducts contained pus, and there was an abscess in the prostate. Gonococci were found in the secretions of the urethra and knee-joint, but none in the pericardial exudation. Sections of the heart from various places were examined after being hardened in alcohol. The pericardium was universally thickened and swollen and contained numerous widely-dilated blood-vessels with thin walls.

It is probable that the blood found in the pericardial cavity came from the rupture of these vessels. In some places, the lesions of the myocardium, although most intense near the endocardium, appeared to extend from the pericardium and could be traced directly to this. The muscular fibres showed various degrees of degeneration. In the slightest change they appeared slightly swollen, diffusely stained, their nuclei had disappeared, and they frequently contained vacuoles. There was every degree of change from this up to a total necrosis of the muscular fibres, and an entire substitution of areas of purulent infiltration and necrosis for the normal tissue of the heart. Some of the areas of degeneration involved almost the entire thickness of the wall of the ventricle and auricle. Extensive haemorrhage was found in some of the necrotic foci. Gonococci were found in the sections in considerable numbers. In the pericardium very few were found. Gonococci were also found in the joints, but in small numbers. There is but little doubt that the secondary lesions were produced by the gonococci, the same organism found in the urethra. Unfortunately the case is not a complete one, owing to the absence of cultures at the time of the autopsy. The organisms were only studied on cover-slip preparations and in the sections. These organisms conformed with the gonococci in that they were all decolorized by the Gram staining and were only found in the cells. Moreover, the lesions which

were produced were not such as we should expect to be produced by pus organisms or even by the pneumococci. Clinically the course of the disease, especially the absence of fever characteristic of the secondary gonorrhœal affections, is also in favor of a gonorrhœal instead of a purulent infection.

A. V. Meigs,⁵ describes cystic degeneration of the muscular fibres as observed by him in a number of cases. He has found this condition most marked in the fibres of the papillary muscles of the left ventricle, though common in all other parts of the heart as well. The degree of the excavation varies exceedingly; the cavities may be so small that in some instances it is impossible to distinguish them from capillaries (which the author describes as normally present inside of the muscular fibres), or, on the other hand, the hollowing-out process may have gone so far that the fibres are changed into tubes with thin walls. The most characteristic appearances are presented when the fibres are seen in cross-section. "The destructive process in its most extreme form removes the whole of the muscular substance from the centre of the fibre, no part of which, when examined with the microscope, will present the usual appearance of muscular tissue, except the thin outer walls, and even these may show the cross-markings characteristic of heart-muscle only in places. A curious feature is the way in which the muscle-nuclei often lie loosely in the cavities." These cavities do not usually give the impression that during life they were empty, or even that they contained only a clear liquid, for there is always present more or less material which has no distinguishing structure. He has found the hollow fibres most numerous not far from the endocardium or pericardium, and less so deeply in the centre, though it may be unmistakably present in all parts of the heart.

It is impossible to predict, from clinical manifestations, which cases will present this curious change in the heart. It has been seen, in both the parenchymatous and the interstitial forms of Bright's disease, in some cases and not in others. In a fibroid heart the excavations occupy almost exclusively those portions of the organ not affected by the fibroid overgrowth. The writer has also found this condition in some cases of typhoid fever, ulcerative endocarditis, and in young infants that had died of wasting.

In regard to the nature and origin of the process, the author

believes—in view of the fact that the muscular fibres of the heart are penetrated by capillaries, and are not, therefore, truly solid bodies, together with the appearance of the spaces already described—that the process is one of cystic degeneration. The only other conceivable explanation is that the cavities are minute aneurisms, dilations of the capillaries after they have passed into the muscular fibres. Such an assumption would be inconsistent with the nature of the material lying within the cavities, which is amorphous and granular, or is yellowish pigment in irregularly-shaped flakes, all looking as if suspended in a liquid, and thus presenting the characteristics of a section of a cyst. Thus it would seem that the cavities are true retention-cysts, and that they are produced in a manner parallel to that of renal cysts. A capillary must become blocked in two places and the portion between these dilate, thus forming a cyst. It is quite possible that the vacuolations are false cysts formed by the escape of blood into the substance of the fibres (*haematocele*), or by degeneration and softening of the muscle-substance itself. If these cavities are true retention-cysts it will be the first time that it has been shown that cysts originate within the vascular channels. The writer considers this cystic degeneration very common, as it has been found by him to be present in many ordinary diseases. To meet the criticism that the appearances which he has described as disease may be due to faulty technique, the author states that all his preparations were made, as far as possible, upon a uniform plan, both in the preservation of the tissue and in the mounting of the sections. The tissues were almost all preserved in 70-per-cent. alcohol, and the imbedded material was paraffin, except in a few instances, when celloidin was used.

PERICARDITIS.

Marfan⁴⁵¹ discusses the value of the sign of Pins, of Vienna. In infantile pericarditis with effusion pseudopleuritic signs may be observed, which disappear when the patient is placed in the knee-chest position, and this constitutes the sign of Pins, and is considered to be of great value.

When a child has pericardial effusion, examination of the left back may show dullness, a pleuritic rub, and broncho-egophony, but without râles and with little or no modification of the thoracic vibrations. In the knee-chest position these symptoms may dis-

appear. They are due to atelectasis at the base of the left lung, caused by pericardial effusion, together with the relatively large heart and small thorax of the child. For the production of this sign it is not even necessary that there should be pericardial effusion. Thickening of the pericardium without effusion may be enough, as was shown in a case verified by autopsy.

Slev⁵ states that tuberculosis is almost as frequent a cause of pericarditis as rheumatic fever. Usually the infection comes by way of caseous mediastinal lymph-glands and less frequently by extension from the pleura. In a few instances it forms a part of a general tuberculosis of the serous membranes. The morbid condition found after death may be (1) adhesion (usually accompanied by great thickening of the pericardial layers) and (2) effusion. The tuberculous process rarely invades the ventricular muscles, but the auricular muscle may be much infiltrated. The condition of adhesion is rather more common than that of effusion. The effusion may be (*a*) mainly plastic, the amount of fluid being small; (*b*) more commonly there is extensive sero-fibrinous exudation; (*c*) the effusion may be deeply blood-stained, owing to great engorgement of the membranes, and the quantity effused is often large; (*d*) the effusion may be purulent, apparently from the commencement, and the amount in these cases may also be large, so that the diagnosis of left-sided empyema has been made.

The prominent clinical features are those of cardiac dropsy, the symptoms being due to cardiac insufficiency following the dilatation and hypertrophy consequent on the adhesive pericarditis. Physical signs of cardiac disorder may be little, if at all, marked in cases of acute tuberculosis, either general or with cerebro-spinal symptoms. In acute pericarditis there may be nothing in the symptoms to suggest that the disease is tubercular. The diagnosis is extremely uncertain, and, as a rule, impossible unless there are other evidences of tuberculosis elsewhere. If the effusion, when withdrawn, is found to be haemorrhagic, the probability of the process being tubercular is very great. The fever in acute cases is more irregular than in ordinary pericarditis. The majority of the cases showing adhesion presented no symptoms until those of cardiac insufficiency developed. In the treatment of the acute condition, Osler recommends the local application of cold, either by an ice-bag or, if this is disagreeable to the patient, by means of

Leiter's coil, the water being allowed to run through the coil at any desired temperature.

D. B. Lees,² after a considerable experience in the use of ice in the treatment of pneumonia, has also tried it in pericarditis with very satisfactory results. He reports five cases thus treated, and concludes that the ice-bag, when used with reasonable caution, is a safe application in pericarditis, that it is usually liked by the patient, that it tends to check the violence of the local inflammation and to hinder effusion, and that it may even help to cause absorption of effusion which is already present.

Virchow⁴¹ reported a case of isolated tuberculous pericarditis at the Berlin Medical Society. The patient was a man, aged 49, who had taken a severe cold eight weeks previously, having till then been in perfect health. Three weeks later, when brought to the hospital, there was present hydropericarditis, œdema of the limbs, ascites, dyspnoea, but no fever. The necropsy showed considerable effusion in the peritoneal and in both pleural cavities, and the pericardium was filled with a large quantity of dark, thin, haemorrhagic exudation. The other organs were normal. The whole heart was considerably hypertrophied and the pericardium enormously distended, and its surface covered with a thick, fibrinous exudation of a villous appearance. On section of the much-thickened pericardial walls an immense eruption of tubercles could be seen in the deeper layers, next to the muscular tissue. The tubercles were full of unusually large giant-cells, but contained comparatively few tubercle bacilli. Virchow regards this case, like the others previously observed by him, as one of protracted latent pericarditis, going on to the production of a highly-vascularized new connective tissue. The haemorrhagic product arose from the new-formed, deeper layers. He considers the tubercles to be a secondary pathological development in the inflammatory new formation. The first case of the kind that came under his notice —that of an old man of 80, in whom there was no other trace of tuberculosis—was a warning to him against the then-prevailing view of a specific dyscrasia as the essential condition of the development of tuberculosis. According to the latter theory, a general instead of a local disease would have resulted. In most of these cases the haemorrhagic exudation was so great as to suggest, at first, a rupture of the heart.

Ménétrier and Pineau⁷ report a case of purulent pericarditis caused by pneumococci, which found their way to the pericardium, not through the general circulation, but by infecting the walls of the bronchial tubes and a mediastinal gland which lay just in front of the upper part of the pericardium, and in which a cavity containing pus was found. Cultures and inoculations showed the presence of pneumococci in the bronchial tubes, the gland, and the pericardium. There had been no pneumonia. A few cases have been reported which were considered examples of primary infection of the pericardium by pneumococci, as there was no pneumonia present. But the author points out that there may be an infection of the bronchi without pneumonia, and that these cases of pericarditis are probably secondary to the bronchial infection.

Ebstein²⁹ refers to a paper, published by Rotch⁹⁹ in 1878, giving the results of experiments on the dead subject with respect to fluid accumulations in the pericardium, and pointing out the importance of dullness in the fifth right intercostal space in the diagnosis of early pericardial effusion. Professor Ebstein's clinical observations on forty-nine cases of pericarditis coming under his care during the last twelve years confirm the importance of this sign. Pericardial effusion, as a rule, can be first detected by the appearance of dullness at the right edge of the sternum in the fifth intercostal space. This region Ebstein calls the cardio-hepatic angle. The dullness is more marked than the partial liver-dullness which is met with in health in the fifth right interspace; the dullness due to the effusion is absolute or almost absolute. The author points out that fluid commencing to be effused into the pericardial cavity accumulates first at the inferior part, and on the left side before the right, owing to the extension of the pericardial sac slightly lower on this side than on the right. But the detection of the commencing effusion on the left side is very difficult, and hence the dullness on the right side is the point of importance in diagnosis. The value of the sign in doubtful cases of pericarditis is discussed, and apparent exceptions to the above rule are mentioned. The author believes, from his clinical observations, that he is justified in regarding absolute dullness arising at the cardio-hepatic angle, especially if it should develop while the patient is under observation, as a probable, almost certain,

sign of fluid accumulation at the right lower angle of the pericardial cavity,—the right lung and pleura, of course, being healthy.

Ulrich Lückinger^{1909 July} reports the case of a farm-laborer who fell from a hay-wagon, and received a contusion of the left side of the thorax and a simple fracture of the left leg. The injury to the chest seemed to be trivial, as there was no fracture of the ribs or sternum, and apparently no injury of any of the thoracic organs. During the course of the third night after the accident the patient began to complain of palpitation of the heart and difficulty of respiration. Examination revealed pericardial friction over the right ventricle. Evidence of pericardial effusion was apparent in a few days, and pleurisy with exudation followed a few days later.

VALVULAR LESIONS.

L. Bard²¹¹, *Feb. 28, Mar. 19* protests against the importance generally accorded to mechanical phenomena in the production of asystole,—a condition which he attributes to active inflammatory processes. He is struck with the fact that at autopsies of those who have succumbed to valvular disease it is usually possible to recognize, even with the naked eye, the presence of inflammatory lesions in more or less active stages of evolution. Generally the lesions consist of a row of minute fibrinous vegetations along the free border of the valve, which may be rigid as the result of chronic endocarditis. There may also be ulceration of more or less depth. The histological examination of these diseased valves also shows active inflammatory processes. Instead of cicatricial tissue, composed of well-defined connective-tissue fibres with a few fixed cells, the writer finds fibrin in process of organization and a round-cell infiltration.

In a series of observations, the writer found that cases of asystole, in which purely cicatricial tissue was found in the valves, were extremely rare. The same result was apparent in cases of interstitial myocarditis, and in arterial disease. This was very striking in the coronary arteries. Although stenosis of the coronary arteries plays an important part in the production of angina pectoris, numerous cases have been reported in which marked stenosis of the coronaries existed without angina pectoris. In correspondence with this fact the writer found, in cases of stenosis without angina, that the atheromatous lesions were in a state of

quiescence; while in several cases of angina the arteries showed an active, progressive inflammation with little or no calcification, and softening and infiltration of small round-cells in the arterial wall.

In opposing the mechanical theory of asystole, the writer maintains that the heart reaches the condition of asystole more through the impaired vitality of the tissues caused by inflammation than by the extra work which mechanical obstacles impose; or, in other words, the nature of the pathological lesion is of more importance than the mechanical extent; the dynamic influence of the inflammation is of more account than the static influence of the obstacle which has been created by the inflammation. The mechanical form of asystole produced by overwork of the heart is more common in secondary cardiac hypertrophy and dilatation than in primary cardiac disease. This distinction is not of purely speculative value, but it has great importance from the stand-point of diagnosis and treatment. The diagnosis of these two conditions is difficult, and is to be determined by the results of auscultation and the recognition of inflammatory processes going on in the joints, the serous membranes, and the viscera. Cicatricial lesions give rise to loud, harsh murmurs, while inflammatory conditions produce softer sounds, because the tissues in the latter case are less dry, rigid, and vibratory.

In the matter of treatment we may re-assure those who have old, fixed lesions and free them from the useless restrictions which are often imposed. Hygienic and preventive measures must be adopted to prevent the development of new inflammatory lesions, and to favor muscular vigor. Baths, antirheumatic measures, and moderate physical exercise are to be prescribed. On the other hand, while the inflammatory condition is present, treatment must be enforced with great strictness. Absolute rest in bed, in the horizontal position, must be required until the inflammation subsides. Revulsives, including the cautery, may be used. Milk and iodide of potash promote resolution; the salicylates and salol have a more or less specific influence; tannin and lime-salts promote sclerosis; bromide or valerian quiets palpitation. Digitalis is almost useless as a curative agent, but as a final resort is useful to make the patient more comfortable. It fills the rôle of morphine injections in cancer rather than that of quinine in malaria.

Duroziez¹⁷,_{Nov. 22, 1892} reports numerous cases in which valvular lesions were found associated with chorea. He finds that chorea is almost always accompanied with rheumatism, and concludes that the valvular lesions are produced by the latter; and that when chorea alone is found with abnormal bruits, these are due to anaemia and not to valvular lesions.

In discussing a case of mitral obstruction and regurgitation with tricuspid insufficiency, Popoff²,_{June 21} refers to the pressure of the overdistended right auricle and veins upon the aorta, and especially on that part of the aorta from which the innominate artery arises. Of the branches of the innominate, the pressure of the veins will be more marked on the subclavian than on the carotid artery, as the latter lies more internally. Thus, in tricuspid insufficiency the pressure of the distended and pulsating veins upon the underfilled arteries will exert this action particularly on the right subclavian artery, and so lead to a weakening of the right radial pulse. In the case alluded to there was no radial pulse on the right side. The author says that a diminished right radial pulse in such conditions is characteristic of tricuspid insufficiency, and it will be more marked the weaker the action of the left ventricle. The left radial pulse may also be diminished in a similar manner in mitral stenosis and incompetence in the absence of tricuspid insufficiency. Thus, in mitral obstruction the phenomenon of the *pulsus differens* may vary according to the degree of compensation.

Pic^H,_{Ju. 7, 1892} reports the case of a man of 42 who first showed signs of cyanosis at the age of 24, during an attack of pneumonia. Following this there were periods of cyanosis occurring during attacks of bronchitis and lasting as long as the cough continued. Finally the cyanosis became intense, accompanied by extreme dyspnoea and œdema of the extremities. The post-mortem examination showed hypertrophy with dilatation of the right auricle. The foramen ovale showed an opening sufficient to admit the little finger. A valve was present which closed the opening when pressure was made against it from the left toward the right auricle, but which was forced open by pressure on the right side. The cyanosis was, then, produced whenever the pressure in the right auricle exceeded that in the left, as during pneumonia or bronchitis, the venous blood thus being mingled with the arterial blood.

HYPERTROPHY OF THE HEART.

An analysis of one hundred and five cases of heart hypertrophy, with the results of the post-mortem examinations, is presented by William T. Howard, of the Johns Hopkins Hospital.⁸⁸ For purposes of comparison the size and weight of the normal heart are first considered. The standard of heart-weight adopted is 280 grammes (9 ounces) for men and 260 ($8\frac{1}{2}$ ounces) for women. In the heart of an adult male, weighing 280 grammes (9 ounces) the wall of the left ventricle averages 12 millimetres in thickness, the wall of the right ventricle 4 millimetres; the length of the cavity of the left ventricle 6.5 centimetres, of the right ventricle 7 centimetres; the circumference of the mitral orifice is 9 centimetres, of the aortic orifice 6.8 centimetres, of the tricuspid orifice 10 centimetres, of the pulmonary orifice 6 centimetres. In estimating hypertrophy, several sources of error must be guarded against. The body-weight, the body-length, and the heart-weight are to be compared. The condition of the ventricles as regards contraction is to be considered. A strongly-contracted ventricle has very much thicker walls than a ventricle in diastole; so that measurements alone are not to be trusted.

Causes Leading to Heart Hypertrophy.—We cannot conceive of such a thing as idiopathic hypertrophy of the heart, or over-growth of the heart-wall, without a mechanical cause. Heart hypertrophy follows any condition or set of conditions increasing the amount of work done by the heart. The causes of heart hypertrophy may be divided into two broad classes: (1) causes lying in lesions of the heart itself, interfering with proper function; (2) causes outside the heart.

The first class is subdivided into (a) lesions of the valves and (b) lesions of the heart-wall. Of one hundred and five cases of heart hypertrophy valvular lesions were present in thirteen. Of lesions affecting the heart-wall there were found myocarditis, tuberculosis, and aneurism. In some cases of localized myocarditis there is a compensatory hypertrophy of other portions of the same wall. There was one striking example of tuberculosis leading to extensive destruction of the heart-muscle. The affection of the heart was secondary to pericarditis. The walls of the auricles were almost completely converted into a grayish-white

material, with only a thin film of what appeared to be muscle-tissue. There was also a well-marked miliary tuberculosis of other portions of the heart. The thickened pericardium when incised was usually of a grayish color, with many opaque, yellowish points scattered here and there, and often continuous. Microscopically numerous miliary tubercles were found invading the whole thickness of the heart-wall, and even the musculi pectinati. In a second case there was well-marked tuberculosis of the wall of the left ventricle. An aneurism of the heart-wall may throw out of function so large an area of muscle that the remainder must hypertrophy to make up for the portion lost. Again, an aneurism may be so situated in the heart-wall that the function of one or more of the valves may be interfered with.

The second class of causes of heart hypertrophy, those acting outside the heart, may be subdivided into (*a*) causes acting directly and interfering mechanically with the contraction of the heart and (*b*) causes acting by increasing the general arterial blood-pressure. Cases of the first class practically resolve themselves into pericardial adhesions. There were eight examples of this lesion, and of these four were tuberculous. The adherent pericardium was found to be thickest over the left ventricle, thus throwing greater stress upon this portion of the heart. The thickening of the adherent pericardium being, in most cases, due to a firm connective tissue, which is stiff and inelastic, acts as a splint, and thus affords a great obstacle to the cardiac contractions. When the pericardium is adherent both to the heart and to the thickened and bound-down pleura, the resistance to be overcome is even greater. Another burden is put upon the heart when the adherent pericardium is also bound to the anterior chest-wall and to the diaphragm. In seven out of the eight cases there were hypertrophy and dilatation of the right ventricle,—in most cases extreme,—and in five cases uniform dilatation of the whole heart.

Of the causes acting by increasing the general arterial blood-pressure, some offer mechanical obstruction to the blood-flow in territorial areas, others to the blood-flow in the whole general arterial system. To the former class belong (*a*) nephritis and (*b*) pressure of tumors and the like upon vascular trunks.

Nephritis.—There were fourteen cases of left-ventricle hyper-

trophy associated with nephritis without arterio-sclerosis. This is 14.4 per cent. of the number of cases of heart hypertrophy,—relatively a very small percentage. This number included only one case of acute nephritis. To the much-discussed question as to the manner in which mechanical obstruction to the blood-flow is caused in nephritis, the writer has nothing new to add. In the kidneys of these cases of chronic diffuse nephritis with left-ventricle hypertrophy, the sclerosis of the renal arteries is secondary to the renal atrophy. It is clearly the result, and not the cause, of the renal atrophy. In the primary, true, or general arterio-sclerosis, the atrophy of the renal tissue is caused by the change in the renal vessels, and is dependent upon it. This is an important distinction between these two classes of cases. The pressure of tumors was illustrated in two cases, in both of which large uterine tumors pressed upon the abdominal aorta and the iliacs.

Causes producing mechanical obstruction to the blood-flow in the whole arterial system include (*a*) the action of drugs and poisons (as alcohol, digitalis, and tobacco); (*b*) excessive work; (*c*) hydramic plethora (including general arterial hypoplasia); (*d*) cardio-nervous influences; (*e*) arterio-sclerosis.

The condition of constant hydramic plethora is met with in certain beer-drinkers, and causes marked hypertrophy of the left ventricle. The same result is met with in individuals with congenital hypoplasia of the aorta and arteries, where the vascular area is proportionately small, and in whom there is, therefore, naturally, a relative haemic plethora. An instance of cardio-nervous influences causing hypertrophy is found in Basedow's disease.

Arterio-sclerosis was found to be by far the most common cause of left-ventricle hypertrophy. In fact, it is the most frequent of all causes of heart hypertrophy due to conditions lying outside the heart, occurring in subjects over 30 years of age. Of the 105 cases of heart hypertrophy from all causes, there are 62 cases dependent upon arterio-sclerosis, or 60 per cent. Of these 62 cases, 38 had well-marked chronic diffuse nephritis, 17 slight chronic diffuse nephritis, 3 subacute nephritis, 1 acute glomerulonephritis, and 3 normal kidneys. Aneurism of the aorta occurred in 4 cases. In 20 cases, or about 32 per cent., there were valvular lesions. In most of these hearts the coronary arteries were dilated,

thickened and tortuous, and the seat of recent or chronic endarteritis. There is practically a single limit to the amount of hypertrophy that the heart is capable of. Hypertrophy must reach its ultimate limit when the coronary arteries become extensively involved in the general process and the cardiac circulation becomes obstructed and diminished.

Hypertrophy of right ventricle occurred with arterio-sclerosis . . .	in 52 cases.
" " " " " adherent pericardium . . .	" 6 "
" " " " " valvular lesions . . .	" 8 "
" " " " " nephritis . . .	" 3 "
" " " " " hydramic plethora . . .	" 1 case.
Total, . . .	<hr/> 70 cases,
	or 66.6 per cent.

Hypertrophy of the auricles is of such rare occurrence, in any great degree, except as the result of stenosis of the mitral valve, that little attention need be paid this subject.

To sum up, the analysis of 360 autopsies shows 105 well-marked cases of heart hypertrophy, or 29 per cent. The following table gives the relative frequency of the conditions producing heart hypertrophy:—

Arterio sclerosis	in 62 cases, or 59.0 per cent.
Nephritis	" 14 " " 13.4 "
Valvular lesions	" 13 " " 12.4 "
Adherent pericardium	" 8 " " 7.6 "
Work	" 4 " " 3.8 "
Tumors	" 2 " " 1.9 "
Aneurism of heart-wall	" 1 case, " 0.95 "
Hæmic plethora	" 1 " " 0.95 "
Total,	<hr/> 105 cases, " 100.00 "

This table shows with startling clearness that arterio-sclerosis is a very much more common disease than is generally supposed. Of the 59 cases of heart hypertrophy in persons of 40 years of age and over, 48 cases, or 81 per cent., are due to arterio-sclerosis.

Finally, in mechanical obstruction to the circulation, heart hypertrophy is a condition very much to be desired, and the amount of hypertrophy present, if the individual is in fair health, may be taken as an index of the gravity of the lesion, or lesions, causing it.

ANGINA PECTORIS.

J. Burney Yeo¹⁵ considers that the classification of cases of angina pectoris and their separation into distinct groups appear somewhat forced and unnatural. The cardiac lesions underlying

anginal attacks may vary in their nature, but the attacks themselves differ from each other only in severity. He does not admit the *pseudo*-angina of some authors, although hysterical, imitative anginas certainly occur. There is simply a gradation of severity and curability between the so-called cases of *pseudo*-angina and those of *true* angina. The only sure ground of classification is the ascertainable absence or presence of cardio-vascular changes. In all the graver forms of angina the writer believes that there exists a serious organic, cardiac, or vascular lesion, and that in the milder or curable forms there is simply a cardiac neuralgia or hyperesthesia, induced either by temporary conditions of cardiac malnutrition or cardio-vascular strain; or it may be dependent on an inflammatory affection of branches of the cardiac plexus, itself dependent on an aortitis; or else it may be brought about by states of blood-contamination, associated with vasomotor excitement and increased arterial tension. The term *vasomotor* angina rests on an hypothesis that is by no means established, and is inconsistent with extended clinical observation. The heightened arterial tension and "vasomotor spasm," which has been assumed by some physicians to be the cause of anginal attacks, may be merely an incident of the same. Heightened arterial tension is a frequent incident, probably of a reflex nature, in other neuralgias. This increase of vascular tension will be found to be a sequence, not a precursor, of the attack, the shock of pain causing a reflex irritation of vasomotor centres.

In regard to the causation of attacks of angina pectoris in the graver cases which are associated with serious structural disease of the heart and vessels, we find that in by far the greater number of deaths from organic disease of the heart all the various lesions may be present which have been found in fatal cases of angina; and yet no true anginal attacks have ever been complained of. There is some additional circumstance needed to account for the angina. The most serious forms of angina seem to have a complex causation. First, there must be a neurosal element; the nerves of the cardiac plexus suffer irritation and an intense cardiac nerve-pain is excited; this acts as a shock to the motor nerves of the heart, and thus reacts on the heart-muscle, which, in fatal cases, is already on the verge of failure from organic causes; and if there should be excited at the same time some reflex arterial

spasm, the heart will have to encounter an increased peripheral resistance as well. In such cases the rapidity of the fatal issue is no argument against the neuralgic nature of the angina. In certain conditions, especially in habitual high arterial tension, strain is apt to fall (when the aortic valves are competent) rather on the first part of the aorta than on the ventricular surface, and anginal attacks are more prone to occur in these cases, as this part of the aorta is in such close relation with the nerves of the cardiac plexus, rather than in those cases in which the strain is felt on the interior of the cardiac cavities. The causation of the less-grave and more-remediable forms of angina is also, in many instances, complex. A cardio-vascular system, feeble and poorly nourished, on account of anaemia, may be submitted to undue strain; or there may be some intoxication such as that of tea, tobacco, alcohol, gout, or some intestinal toxin, irritating the cardiac and vasomotor nerves, increasing peripheral resistance, and so exciting anginal attacks, which may altogether pass away and be completely recovered from. Vasomotor spasm, as a unique cause of attacks of angina, must be set aside as inconsistent with extended clinical experience. Cases of angina pectoris, both of the milder and graver forms, occur without any evidence of vasomotor spasm or of heightened arterial tension; and the conditions of heightened arterial tension, together with a feeble cardiac muscle, very commonly co-exist, without any tendency whatever to the development of anginal attacks. The argument in favor of a vasomotor causation has been inferred from therapeutic experiment and the relief to the paroxysm which has attended the use of agents which cause arterial relaxation. But most, if not all, of these vaso-dilators are also anaesthetics, and, as Balfour has pointed out, it is probably to their anodyne action on the sensory cardiac nerves that they owe their chief efficacy; Grainger Stewart has also pointed out that nitrite of amyl has a direct effect on nervous structures, and that it relieves other forms of neuralgia. The writer has seen a patient "with his countenance purple and the vessels almost bursting from overengorgement, due to the influence of nitrite of amyl, without experiencing the slightest relief to his anginal attack." Still, it is readily admitted that nitrite of amyl and its allies do relieve some anginal attacks, and to a certain extent, and in some cases, by the lowering of the vascular tension, without, however, admitting that

there is a direct causal relationship between the anginal attacks and heightened arterial tension.

The true indications for treatment in angina pectoris are thus summarized: 1. To maintain or improve, when defective, the general nutrition; to avoid all strain, physical and emotional; and so to relieve cardiac feebleness and excessive effort. 2. To relieve dyspeptic conditions and flatulent or faecal distension of the stomach and intestines. 3. To forbid the habitual consumption of agents which may exercise a toxic action on the heart, such as tea, coffee, tobacco, alcohol, etc., or that may introduce or develop toxins in the alimentary canal. 4. To avoid and remove all gouty and other blood contaminations. 5. To give such tonic remedies as may improve the cardiac tone and lessen existing tendencies to cardio-vascular degeneration. 6. To relieve the paroxysmal attacks by sedatives and stimulants.

In considering the medicinal treatment of these cases in the intervals between the attacks, iron with small doses of digitalis is suggested in cases of anaemia and cardiac debility from malnutrition. Arsenic is sometimes of greater value than iron. Balfour asserts that arsenic is "indispensable in all forms of weak heart accompanied by pain." Strychnine is of great value as a cardiac tonic. In highly neurotic cases the combination of iron or arsenic with potassium or sodium bromide is very beneficial. Valerianate of zinc combined with $\frac{1}{60}$ grain (0.001 gramme) of phosphorus is also valuable in such cases. Long periods of immunity are apparently brought about by occasional recourse to a mild iron tonic with 5-minim (0.32 gramme) doses of tincture of digitalis. The idea of giving a combination of nitroglycerin and digitalis during the interval is a concession to the vasomotor hypothesis of the causation of the attacks. Potassium iodide is of very great value when there are obvious signs of cardio-vascular degeneration and of the gouty state.

In the paroxysms of angina the nitrates afford relief in many cases, although it is extremely doubtful that they do so by their action as vaso-dilators. They are capable of relieving the attack when there is no certain evidence of the existence of vasomotor spasm. Douglas Powell says he has found them "far more reliable in the graver cardiac cases than in the purer vasomotory." Balfour and Grainger Stewart both believe that they act as direct

analgesics, and that they have the power of relieving pain in other as well as in cardiac neuralgias, independently of their relaxing action on the blood-vessels. When the nitrites fail, Balfour resorts unhesitatingly to chloroform inhalations, contending that "far from being unsafe in cardiac disease, it is often of the greatest use in these cases." Sulphuric ether is used also for the same purpose, but "it is not rapid enough." In severe and protracted attacks we may be obliged to have recourse to hypodermatic injections of morphine. A hot mustard poultice to the precordial region may be useful at times. The application of the continuous electric current along the course of the vagus in the neck and down the arm, in cases where a distinctly painful *aura* is experienced in the hand, has been found useful in warding off attacks. Leeches applied over the sternal region and repeated small bleedings from the arm have also been found useful.

In a review of the treatment and contra-indications Huchard¹¹² writes as follows in regard to the latter: Digitalis raises the arterial tension and is, therefore, contra-indicated. Sparteine and convallaria are useless. Caffeine and strophanthus sometimes produce favorable results. Belladonna and bicarbonate of soda are useless and perhaps harmful, because the belladonna disturbs the nervous mechanism of the heart and contracts the arteries. Electricity is generally unreliable or dangerous, and faradization should be used only in threatening syncope. Cocaine is dangerous, since it causes contraction of the vessels and cerebral anaemia, thus tending to produce syncope. Inhalations of oxygen are useless. Antipyrin and allied drugs exert no favorable influence on the circulation; and if it be true that they dilate the peripheral vessels and contract the central ones, they will be contra-indicated. The value of bromide of potassium in small doses less than 60 grains (4 grammes) he believes to have been exaggerated, and claims that large doses are objectionable. Chloral can be used as an hypnotic and anaesthetic in doses not exceeding 30 grains (2 grammes); but is contra-indicated in larger doses on account of its depressing effect on the heart. Paraldehyde has been uncertain in its results. Sulphonal and urethane act too slowly. The salts of potash act unfavorably on the cardiac muscle, and if there is renal insufficiency they retard the elimination of poisons coming from within or without the body. Blood-letting acts slowly; it

may abort, but it cannot cure the attack; venesection also favors syncope. Chloroform inhalations may be considered when nitrite of amyl and injections of morphia fail. The inhalations should be short and interrupted, the face and pulse being closely observed. Such measures as ether inhalations, ingestions of ice, immersion of the left arm in hot water are uncertain, and only succeed in pseudo-angina. He strongly adheres to the treatment which he has adopted for years, namely, the administration of iodides in daily doses of 15 to 45 grains (1 to 3 grammes) continued for several years, with amyl nitrite or nitroglycerin during the attacks. They combat the pain, relieve the arterial sclerosis, and thus guard against cardiac ischaemia, which is the chief danger. The author considers that the beneficial action of the iodides is due to their influence on the capillaries, which become dilated, the blood at the same time being rendered more fluid; thus the absorption of pathological exudations is favored and arterial tension is reduced. Intolerance of the drug is due to the presence of impurities, especially iodates, and sometimes to renal insufficiency. As loss of appetite, epigastric pain, and diarrhoea may arise, it is well to give the drug for twenty or twenty-five days only in each month, prescribing in the intervals small doses of nitroglycerin.

Huchard^{11 Apr. 30} warns against the dangers of morphine in the asphyxic variety of angina pectoris. The danger in angina pectoris does not depend on the severity of the pain, but death usually occurs by syncope and without pain. The danger consists in the ischaemia of the myocardium caused by coronary obstruction, and fatal weakness of the left ventricle follows. In prolonged and dangerous attacks the first indication is to strengthen the heart and restore its exhausted contractility by injections of caffeine, ether, camphor, nitroglycerin, etc. Morphine is generally useless, as there is not time for it to act in attacks of a few seconds or minutes. It is very dangerous when asphyxia is threatened, and the writer gives an instance in which dangerous asphyxia was produced by an injection of 0.02 gramme ($\frac{1}{3}$ grain), and death followed later in the day, after a second injection.

BRADYCARDIA.

H. Freng^{996 Sept. 10} reports the case of a sailor, aged 59, who has suffered from rheumatism and had been subject for six years to

attacks of palpitation, dyspnoea, precordial pain, and syncope. For the last few months the attacks of syncope occurred every five minutes, and were accompanied with convulsions. The pulse varied from twenty-six to eight pulsations a minute, but was of remarkable force and regularity. There was a constant systolic souffle at the base. The autopsy showed a pericardium completely adherent, slight hypertrophy of the left side, atheroma of the aorta, calcareous deposits on the mitral valve, atheroma and stenosis of the coronary artery, without fatty degeneration of the muscle.

TACHYCARDIA.

D. T. Lainé¹¹² reports a case of paroxysmal tachycardia which he had considered of the "essential" variety, but in which the tachycardia disappeared after the patient had passed a few calculi *per urethram*. The author reports the case as showing how irritation in one of the abdominal viscera may be the only apparent factor in this condition. He divides tachycardia into three classes: 1. Those cases due to paralysis of the pneumogastric, of central origin when produced by the presence of a clot or tumor in the brain, and peripheral when due to the presence of some mediastinal growth. 2. Those cases of reflex origin induced by the irritation of a sensory nerve, especially when the source of irritation lies within the pelvic or abdominal cavity; for example, those caused by the presence of renal or biliary calculi, ovarian or uterine disease, a floating kidney, and rectal or prostatic inflammation. 3. Those in whom no organic changes or a probable source of irritation can be detected. To this class the term "essential paroxysmal tachycardia" has been applied.

WOUNDS OF THE HEART.

V. P. Flament²⁴³ relates the case of a soldier who was taken with sudden, severe pain in the right chest, during a violent attempt to lift the trunk of a tree. He was thought by the physician who saw him to have ruptured a costal cartilage by the action of the pectoralis major muscle. Next day, on going to a hospital, no lesion could be discovered, on examination, and the heart and respiration were normal. He walked about the yard and felt comfortable all day. The next morning the patient suddenly complained of pain, and expired almost at once. At the

autopsy an ordinary sewing-needle was found to have penetrated the chest-wall in the fourth right intercostal space, and was buried in the pericardium. The pericardial cavity was filled with blood. On the surface of the right ventricle were found two small erosions, one of which disclosed an opening into the cavity of the heart.

At a meeting of the Royal Academy of Medicine, in Ireland, William Thomson ^{Dec 31, 1892}⁶ reported the case of a lunatic who had pushed a pin up to its head into the fifth left intercostal space, with fatal result. A similar case was that of a female school-teacher, who had died of pericarditis. At the inquest of the Lambeth coroner's court, a needle was found which had penetrated the apex of the heart. It was a case of suicide.

Heyl ^{May 27}¹ reports the case of a soldier, who was stabbed with a pocket-knife over the upper margin of the fifth rib, three inches to the left of the median line. At first, shock was profound, but, with the aid of stimulants, the man was able to live for three days. At the autopsy the pericardium was found distended with bloody serum. The puncture extended not more than one-eighth inch into the heart-muscle, at a point in the raphe between the ventricles and one-third of the distance from the apex to the base. There was a plastic pericarditis and pleuritis.

Cox ^{Aug 186} found a 32-calibre rifle-ball imbedded in the muscular tissue of the left ventricle of a bear which was caught in a trap. The ball was encysted and old pericardial adhesions were present.

METHODS OF DIAGNOSIS.

Oesophageal Auscultation.—During the past two years Hoffmann ^{Jan.}² has used for this purpose a soft, graduated stomach-tube, to which a glass tube and ear-piece are attached. The tube was furnished from its point with centimetre markings, so that one could at any time readily judge by a simple glance how many centimetres the point of the sound had passed beyond the teeth. The heart-sounds are best heard when the endostethoscope, as this instrument is called, is introduced to a depth of thirty to thirty-five centimetres. They are very loud if the breath is held. The systolic sound often appears double; the diastolic is not so loud. Higher up the heart-sounds are no longer heard, but only the breathing. The diagnostic value of this mode of auscultation

cannot as yet be definitely stated. Some doubtful cases have been cleared up by it. Thus, in one case in which no cardiac murmur could be distinguished by the usual method of auscultation, the endostethoscope revealed a marked presystolic murmur. A second patient was said to have been treated for heart disease several years previously. The pericardial dullness was normal, and over the heart there were no murmurs audible, though the first sound at the apex was rough. From the œsophagus a very loud systolic murmur was heard, which had its greatest intensity between thirty and thirty-five centimetres; between twenty-five and thirty centimetres both heart-sounds were distinct, but the murmur was very faintly audible. It is a question whether the point of origin of the murmur can be established in this way. Obviously this method of examination of the heart can never supersede other methods, but will at most be able only to supplement them. Auscultation of aortic aneurisms by this method is not without danger, and must only be undertaken with the greatest caution. Accidental murmurs, such as those due to chlorosis, were also detected by the author with the œsophageal instrument, but less distinctly than by means of auscultation through the chest-wall.

Thermo-palpation.—P. Meissner^{July 15}¹³ proposes to mark out the cardiac area by "thermo-palpation." He finds that the skin over the heart is warmer than over the lung, as tested by a delicate instrument. The right ventricle is warmer than the left, and, in a number of cases at the Göttingen medical clinic, he has been able to determine the position of the interventricular partition during life.

Cardiac Bruits Audible at a Distance.—McAldowie^{Jan.}³⁶ reports a group of three cases in which cardiac bruits were audible at distances of three to ten feet from the chest. In the first case the aorta was found to be much degenerated, and the sound was produced by the rough edges of a laceration of the inner and middle coats, situated in the left posterior sinus of Valsalva and projecting into the blood-current. In the second and third cases there was undoubtedly rupture of one of the segments of the aortic valve.

The clinical significance of these loud bruits is important. They almost always indicate serious lesions at the aortic orifice, although Osler relates one which vanished occasionally, and was evidently functional. The loudness depends, in a great measure,

on the condition of the muscular substance of the heart. A loud systolic murmur shows that the ventricle is acting forcibly, and therefore well nourished. An equally loud diastolic murmur indicates a more serious condition; for, in addition to strong ventricular contraction, it requires primarily very free regurgitation, and, therefore, an extreme variation in the blood-pressure during the different phases of the cardiac cycle, with the resulting violent backward current.

THERAPEUTICS.

Nerium Oleander as a Cardiac Tonic.—Oefele⁸⁰ has employed this drug in seventy-five cases, consisting of valvular diseases of the heart, following rheumatism, fatty degeneration, nephritis with cardiac phenomena, arhythmia, and nervous palpitation. As a general rule he found that nerium oleander has similar effects to digitalis. Toxic symptoms are very rare, but sometimes nausea with a tendency to vomiting, diarrhoea, and other disagreeable gastro-intestinal symptoms manifest themselves after full doses of the tincture. The action of the drug is rapidly manifested, lasts for a considerable time, and consists in the slowing of the pulse, which becomes more regular and strong. The respirations are less rapid. The flow of urine is abundant, and there is also an increase of excretive matters in it. Palpitation disappears, and with it the œdema and dyspnœa. Finally, the organism becomes accustomed to the drug, and it is necessary to increase the dose. The diuretic properties of oleander have been found to be very energetic. It provokes peristaltic action of the intestines. Oleander is, therefore, indicated in affections of the heart and kidneys, particularly when the pulse is rapid, irregular, and feeble; also, where palpitation, œdema, and dyspnœa are present. It is contra-indicated in the presence of diarrhoea and vomiting. The author has administered oleander for as long a period without stopping as twenty-five days, and in one case for forty-seven days. The effect of the drug passes away about ten to fourteen days after it is stopped. The dose, which he considers large, is 7 grains (0.45 grammes) a day. Frequently, however, 2 to 3 grains (0.13 to 0.2 grammes) is sufficient. A very active preparation, preferable in many instances, is the infusion of the fruit, which is the most toxic part of the plant. For prolonged use a

tincture of the strength of 10 per cent. is perhaps the best preparation, and 10 to 20 drops may be given two to three times daily. A powder of the flowers may be given in the dose of 1 to 3 grains (0.065 to 0.2 gramme) in twenty-four hours.

Theobromine as a Diuretic in Cardiac Dropsy.—G. Séé¹⁰ publishes a very careful study of the chemical composition and therapeutic value of theobromine. He advises the use of pure theobromine instead of the mixture known as diuretin, which is supposed to be a solution of theobromine in salicylate of soda, but is, in reality, a solution of theobromine in caustic soda to which salicylate of soda has been added. Séé has found that the bad effect of diuretin on the stomach and circulation is due to the caustic soda, of which there is a sufficient amount to kill dogs when a large dose of diuretin is given them. Theobromine is a derivative of chocolate, and is closely related, chemically, to caffeine. Theobromine has a direct specific action on the renal tissues, stimulating the secretion of urine without altering its quality. The amount of albumen is neither increased nor diminished, and the percentage of urea remains the same. Theobromine may be recovered unaltered from the urine. Rarely, nausea is produced by large doses. No amount of the drug produces any effect on the nervous system. The only effect on respiration is the relief afforded by removing dropsical effusions. There is no effect on the heart or arteries. Theobromine is indicated in any form of dropsy due to the heart, and in pulmonary œdema. It is less effective in hepatic or renal dropsy. There are no contra-indications.

Theobromine, being insoluble, is administered as a dry powder in capsules. Séé's method of prescribing is as follows: The first day 2 grammes (31 grains) are given in doses of $\frac{1}{2}$ gramme ($7\frac{3}{4}$ grains), taken with food or milk; the second day, 3 grammes (46 grains); the third day, 4 grammes (1 drachm); the fourth day, 5 grammes (1½ drachm); on the fifth day and the four following days treatment is suspended. Then, if necessary, 2 grammes (31 grains) daily are prescribed for three days. The drug shows no tendency to accumulate in the system, and the dose does not have to be increased. It is an infallible remedy for cardiac dropsy in all stages, and has succeeded after all other drugs had failed. Comparing theobromine with the other diuretics, Séé remarks that

digitalis acts only on the heart, and produces diuresis only as long as it strengthens the force of the circulation. Strophanthus is a feeble and uncertain diuretic. Caffeine is a true diuretic, but it also, unfortunately, excites the nervous system. Theobromine has ten times as much diuretic effect as caffeine. The latter produces more-prompt but less-persistent diuresis. It has a marked advantage over lactose—an excellent diuretic—in that the latter requires a great amount of liquid, while the former may be prescribed dry. The same objection applies to milk. Theobromine thus permits the use of an ordinary diet. Calomel is dangerous as a diuretic, and maté is only an irritant. The author reported to the Académie de Médecine in Paris the details of seven cases in which he had used theobromine successfully.

DISEASES OF THE ARTERIES.

Duglos³⁵ Nov. 3, 1892 considers the radial recurrent pulse a very important and early sign of arterio-sclerosis. If the radial pulse is compressed so as to interrupt the circulation, after an instant a return of pulsation is perceived in the portion of the artery below the point of pressure, and this pulsation is synchronous with that of the upper portion. This pulsation is due to the shock transmitted to the blood in the lower portion through the palmar arch, and is what is meant by the radial recurrent pulse. For its production two conditions are necessary: a sufficiently powerful cardiac contraction, and permeability of the arteries. Hence it follows that any disease impairing the power of the heart-beat or producing some obstruction of the arteries will show itself readily in the condition of the radial recurrent pulse. Even slight obstruction in the arteries produces a marked effect.

Arteritis.—Lancereaux¹⁴ Mar. 29, May 17 divides all forms of arteritis into three classes: 1. Circumscribed arteritis. 2. Arteritis occurring in plaques. 3. Generalized arterio-sclerosis.

1. *Circumscribed arteritis* commences in the external tunic, is localized in arteries of medium calibre, especially those surrounded with lymphatic sheaths, and remains localized in one or more points of the same artery or of two different vessels. It comprises three distinct varieties,—syphilitic, tubercular, and embolic. The termination is by obliteration or aneurismal dilatation. The first two varieties, due to a general infection of the organism,

are perfectly defined ; the third, produced by the action of a foreign body, is no less clear, notwithstanding its varied origin, in its manifestation and its evolution.

Syphilitic arteritis is localized in the arteries supplied with lymphatic sheaths, and particularly in the cerebro-spinal arteries ; while the other vessels, and notably the large arteries, as the aorta and its principal branches, are slightly or not at all exposed. Several authors, however, have described syphilitic lesions of the large vessels. The writer maintains that these are examples of ordinary atheroma. Most of the other cases of alteration, or of aneurism of the aorta, attributed to syphilis, have no more value than the preceding. The frequency of alterations and of aneurisms of large vessels in the British army and navy has for a long time attracted the attention of English military surgeons. In 114 autopsies on soldiers, Davidson found atheromatous lesions in 22 cases, of which 17 had had undoubted syphilis ; while in 78, who had not had syphilis, only 4 presented the same lesions. The writer says that these statistics, strictly considered, would show that syphilis should produce atheroma, which is far from exact. He claims that these cases of atheroma were merely a coincidence, or, at least, of doubtful origin. It should be remembered that the frequency of these lesions is relatively greater among the colonial troops, who are much exposed to malarial infection, and Lancereaux is led to believe that the frequency of aneurism in the English army is due neither to syphilis nor to alcoholism, but to malaria,—a disease equally common among these troops, and which has a tendency to produce a special form of aortitis. Nevertheless, the author does not deny absolutely the localization of syphilis, in rare cases, in the large vessels.

Syphilitic arteritis, always localized in one, two, or at most in three vessels, always remains circumscribed in several points of small extent. It has a special predilection for the arteries of the cerebro-spinal centres on account of the lymphatic sheaths which surround them, for it is known that the lymphatic system is the avenue of development of the manifestations of constitutional syphilis. Its development in the lymphatic sheaths, or in the external coat of the arteries, leads to thickening of these membranes and the formation of small, yellowish nodes. Later, the lesion causes thickening of the intima and narrowing of the calibre

of the vessel. The middle coat, compressed from without and within, atrophies, and the blood, pressing upon the thinned wall, produces a simple dilatation or a true aneurismal tumor. In other cases, the syphilitic arteritis produces a narrowing or even an obliteration of the calibre; these are followed by an ischaemia more or less complete, and often a rupture of the vessel.

The clinical diagnosis of syphilitic arteritis is very difficult, and sometimes depends only upon the history of the patient and upon the co-existence of specific disorders. The circumscription of the lesions, their limitation to the smaller arteries, their appearance at a not advanced age, and the rapidity of development of the subsequent results also aid in determining the specific nature of the disease, and make the diagnosis very probable, if not certain. The prognosis is always serious, and varies with the extent of the lesions and the importance of the functions affected. The treatment is that of tertiary syphilis, and should be energetically carried out.

Tubercular arteritis is relatively rare, and it likewise tends to become localized in arteries of small or middle size, and especially in those that possess a lymphatic adventitia, as the lymphatic medium is necessary to the development of the tubercle bacillus. It thus shows a special predilection for the cerebral arteries, and especially for the branches of the pulmonary arteries. Histologically, it consists in an infiltration of the arterial tissues with granulation tissue. The process begins in the external tunic, which is filled with round-cells, forming islets, more or less voluminous, which invade the normal tissue little by little, and in which giant-cells are found. This neoplasm degenerates, undergoes necrosis, and ulcerates, as is seen in the arteries which traverse pulmonary cavities. Sometimes the growth becomes vascularized and transformed into fibrous tissue. These processes result in obliteration, aneurismal dilatation, or rupture. Tubercular arteritis is a very insidious condition, and one difficult to diagnose. In reality, the disease does not show itself until it produces phenomena of ischaemia, cerebral or meningeal haemorrhage, or haemoptysis.

Embolic arteritis is usually seated in branches of the pulmonary and cerebral arteries, and the vessels become obliterated by inflammatory action. At other times ulceration occurs, and aneu-

rismal tumors are formed. In such conditions iodide of potash is undoubtedly the only useful or effective remedy.

2. *Arteritis Occurring in Plaques.*—This form, likewise, does not affect the entire arterial system, but is localized in the largest vessels, and particularly in the aorta and its principal branches. Relatively common, it frequently terminates in the formation of aneurisms. The cases observed by the author lead him to the conclusion that usually, if not always, arteritis in plaques is of malarial origin, and only exceptionally is produced by syphilis. The frequency of this form of arteritis in soldiers and sailors is explained by their exposure to malaria rather than to the occurrence of syphilis. The plaques consist of circumscribed thickenings of the arterial coats, generally projecting from the internal surface of the vessel. Their form is circular or elliptical, with a sinuous border, and dimensions which vary from one to eight or ten centimetres. They are usually situated in the ascending or transverse portion of the aorta, but sometimes in the descending portion also; and they may be sufficiently numerous to fuse together and cover the whole thoracic aorta, leaving the abdominal aorta unaffected, as though each portion of the aorta were affected independently of the other. This striking fact is explained naturally by the development of the aorta from different vascular arcs. The plaques are semi-transparent, gray or yellowish in color, firm, elastic, or gelatinous. All the tunics take part in the alteration,—first the external, then the inner, while the middle is compressed between these and undergoes atrophy. The changes consist of inflammatory proliferation, which undergoes fatty degeneration, and then absorption. The intima then ruptures or stretches, and comes in contact with the adventitia, to which it adheres, thus forming the solid, elastic wall of the aneurism. If the lesion is located in the ascending part of the aorta, in the neighborhood of the cardiac plexus, the painful symptom of angina pectoris appears. The pain is intermittent, and may come on during absolute repose. If the lesion is situated in the abdominal aorta, it may involve the abdominal nerve-plexuses. The resulting disorders are but little understood. Excitation of the solar plexus may modify the functions of the stomach and the heart; that of the renal plexus, the secretion of urine; and that of the gastro-intestinal plexus, the digestive function.

The diagnosis of this form of arteritis is based on the existence of one or more murmurs at the level of the lesion, a certain degree of cardiae hypertrophy, dyspnœa, and sudden attacks of angina pectoris. In addition, we must consider the limitation of the lesion to the aorta, and the frequent presence of an aneurism. The prognosis is grave, especially where cardiac insufficiency, angina pectoris, or aneurism is present. Treatment of the early stages demands iodide of potassium, occasional purgatives, iron- and blood-tonics, and hydrotherapy. In the later stages, iodide of potassium; digitalis, if the heart is weak; nearly-complete physical and mental repose; morphine, in case of angina pectoris.

Aneurism.—Bureau⁷ reports a case of aneurism at the apex of the heart, in which there was no obstruction in the coronary arteries, but there was present a circumscribed pericarditis with fibrous adhesions over the aneurism. In studying the etiology of such cases he reviewed all the reports of aneurisms of the heart which have been presented to the Société Anatomique since 1880, with particular reference to the condition of the coronaries. In the great majority the coronaries were found diseased, but many of them were said to be, nevertheless, largely permeable. Pericarditis, with adhesions near the aneurism, appeared to be more common than inflammation of the coronaries, and the writer, without denying the influence of the latter, concludes that pericarditis plays the more-important rôle in the formation of apex aneurisms.

Gouget⁷ also reports a case of aneurism of the apex, in which there were quite extensive pericardial adhesions and also marked stenosis of the coronaries, especially of the right. His conclusions in regard to etiology are just the opposite of those of Bureau, and are based on the result of a review of 28 reported cases. Of these 17 were between the ages of 50 and 80 years. Of 16 cases in which the condition of the coronaries was stated, in only 1 were they said to be normal. Four others, though atheromatous, were easily permeable. In the other 11 cases the arteries were very much narrowed, or even obliterated. The writer is, therefore, inclined to adopt the theory that these aneurisms are caused by myocarditis, which, in turn, is produced by deficient blood-supply, owing to obstructed coronaries. Pericardial adhesions were found in nearly half of the cases. These adhesions, though not the primary cause of the aneurism, are admitted to

contribute to its production by pulling on the apex during the systole.

Hempeln,⁴ contrary to the usual view that haemoptysis from perforation of an aneurismal sack is rapidly fatal, maintains that premonitory haemorrhages from such a perforation are not infrequent. Among 18 cases of aneurism, perforation into the air-passages occurred 7 times. In 1 of these 7 cases there was no haemoptysis and in 2 there were infarcts. In the remaining 4 cases there was premonitory haemorrhage in 3. The haemoptysis began in the first case five weeks, in the second eight days, and in the third four months before death. In these cases of prolonged haemoptysis the diagnosis of aneurism from infarcts or new growths may be very difficult.

Gilbart Smith² refers to several cases observed by him, in one of which the expectoration of bronchial mucus tinged with blood preceded by two years the more-marked signs of aneurism. Haemoptysis in these cases may be caused by congestion of the bronchial mucous membrane due to pressure of the aneurism, and the writer considers this symptom useful as an early diagnostic sign, if the existences of any disease of the lungs, kidneys, and heart, capable of accounting for it, can be excluded.

Höhlein²¹ reports a case in which an aneurism the size of a small apple, arising from the ascending aorta, to which it was connected by a small passage opening just above the semilunar valve, ruptured into the left auricle through a minute aperture. The symptoms of perforation began suddenly with great distress and pain in the cardiac region, extreme cyanosis and dyspnoea, and a feeling of annihilation. Acute pulmonary oedema rapidly appeared, and death came in twenty minutes.

G. Newton Pitt, of Guy's Hospital,²² records eight cases in which small, repeated venesecti^{on}s offered much relief in various painful conditions. He states that increasing experience has shown that a complete cure of a thoracic aneurism is so excessively rare and improbable that our treatment should be mainly directed to preventing the aneurism from spreading, and to relieve such symptoms as urgent dyspnoea and pain; and that it is unwise to starve and repeatedly venesect a patient with the intention of trying to fill the aneurism with an organized clot, as this result is impracticable. A nutritious diet is undoubtedly beneficial, but it should

be in as digestible and light a form as possible; and if there are any urgent symptoms of pain or dyspnoea, the amount of liquid should be reduced to as little above $\frac{1}{2}$ pint ($\frac{1}{4}$ litre) as the patient is able to bear without extreme discomfort. But some patients are quite unable to reduce the amount below $1\frac{1}{2}$ pints ($\frac{3}{4}$ litre). We should insist upon a quiescent life; and where the pain is severe and the size of the aneurism is increasing, absolute rest in bed is essential. Iodide of potassium is generally beneficial. It should be given in gradually increasing doses, but must stop short of that which increases the pulse-rate.

All the main symptoms are alleviated by venesection, but it is not advised as a routine treatment, although some of the aneurisms reported diminished markedly in size after three or four abstractions of blood. Venesection is recommended as the treatment above all others for the relief of the paroxysmal attacks of urgent and intense dyspnoea. The improvement is marked and immediate. Laryngotomy in such cases is of no value, as the obstruction is not due to the paralysis of one vocal cord, but is largely produced by the compression of the trachea by the aneurism. With the loss of blood by venesection the aneurism may be observed to pulsate less vigorously and the pressure on the tube is thus diminished.

The results are even more striking in the more-severe conditions, where the patients have become unconscious, comatose, and moribund. After a few ounces of blood have been taken away they generally recover consciousness, and the urgent symptoms not infrequently pass off, and generally no other treatment is of any value. This may be repeated with each recurrent attack with success, and toward the end it may be necessary to repeat it more than once in the day. It will prolong the patient's life and alleviate his sufferings, but when it is necessary to repeat the operation frequently it only delays, but cannot avert, the fatal ending.

DISEASES OF THE MOUTH, STOMACH, PANCREAS, AND LIVER.

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ASSISTED BY

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PHILADELPHIA.

DISEASES OF THE MOUTH.

Stomatitis.—C. Bernabei ^{105, 624} _{July 11, 1894} ascribes all forms of stomatitis to bacillary infection acting on tissues weakened by toxic agents or by nervous depression. Garrigues ⁹ states that he found epithelial pearls in the mouths of 53 out of 57 newborn infants examined for this purpose. These bodies, which have been carefully studied by A. Epstein, are to be looked upon as physiological formations; they disappear in healthy children after the second month. Epstein, who has observed them as early as the eighth week of intra-uterine life, believes that they are produced by an invagination of epithelium. They are most commonly met with in the middle line of the palate, and on the alveolar process. There may be one or as many as five such bodies present. They consist of epithelial cells resembling those of the mucous membrane of the mouth, but the central cells are flattened by pressure. Though they tend to disappear if uninjured in a healthy mouth, they may, if injured, become the starting-point of ulcerative stomatitis. Cleansing of the infant's mouth, even with soft lint, may inflict enough injury upon the pearls to start the ulcerative process. The presence of the pearls constitutes a weak point in the mouth. Another weak point is the spot where the hamular process of the sphenoid presents, at the junction of the tonsil and soft palate; the mucous membrane is thinner here than elsewhere, and, in sucking, the back of the tongue is pressed forcibly against it; it is, consequently, particularly liable to become the seat of ulceration, and the starting-point of "Bednar's aphthæ." Garrigues, in the treatment of ulcerative stomatitis in infants, recommends swabbing

with water acidulated with a few drops of acetic acid, followed by painting with borax (1 part) dissolved in glycerin (8 parts).

Boas^{41 June 15} reports several cases of epidemic stomatitis analogous to those observed by Siegel. The milk, which was used unboiled, had been obtained in a village where the cattle suffered from the mouth-plague. The disease was characterized by an eruption on the chin, the lips, and the buccal mucous membrane, and in some cases a cutaneous exanthem was present.

Cancrum oris.—R. A. Fleming, of Edinburgh,^{36 Sept.} reports a fatal case of cancrum oris in a girl, aged 4 years, of strumous constitution. Her surroundings were poor and dirty. The disease developed during an attack of measles complicated with catarrhal pneumonia. Fleming discusses at length the history, etiology, pathology, and treatment of noma. At the same meeting Elder^{36 Sept.} communicated a case occurring in a girl of $4\frac{1}{2}$ years, and closely following an attack of measles. Within twenty minutes after death a wedge-shaped piece of tissue was removed from the edge of the wound, and from this inoculations were made in gelatin and agar-agar without result. Microscopically, in sections of the tissue, bacilli were found, most numerous around the vessels, and extending outward into the tissue in decreasing number. They were long and comparatively thin, 3.5 to $5\ \mu$ long, and about $0.8\ \mu$ broad, pointed at each end, commonly arranged in pairs end to end. They could be stained by Gram's method, but were easily decolorized by clove-oil, staining less satisfactorily by Kühne's method.

Miller, in the discussion, referred to the case of a girl, 13 years of age, successfully operated upon by Sir Joseph Lister. All diseased parts, including bone, were thoroughly removed, together with a margin of healthy tissue; pure carbolic acid was applied to all the raw surface; the whitened, necrotic tissue was again thoroughly scraped, a strong solution of corrosive sublimate applied, and an antiseptic dressing put on.

Naresh Chandra Mittra^{1055 June 1} reports a case of inflammation and gangrene limited to the exterior of the cheek, in a man aged 35, in which recovery followed incision of an abscess and antiseptic dressing. He would classify the case under the heading of cancrum oris, but admits that the diagnosis is open to dispute.

John Ward Cousins, of Portsmouth, Eng.,^{11 May} records a case

of canerum oris, followed by extensive ulceration of the cheek and ankylosis of the jaw, in a boy aged 10, after an attack of typhoid fever. The perforation of the cheek was as large as a crown-piece, exposing the teeth. The dense, cicatricial tissue bound the maxillæ firmly together, and the buccal cavity was completely obliterated, the child being fed through a gap between the teeth. The lower jaw was divided to make a false joint, and, the adhering edges of the fistula being freed, contraction steadily advanced until the perforation closed.

Gangrene.—E. W. G. Masterman, of the English Mission Hospital at Jerusalem,<sup>408
v.27</sup> reports two fatal cases of "spreading gangrene around the mouth" in adults. He differentiates the process from canerum oris not only by its occurrence in strong, healthy men without any precursory illness except "a cold," but also because it began in the gums, not as an ulcer, but as a general inflammation of the mucous surface, whence it spread to bone, and later to skin. The final stages of the disease, it is true, resembled noma, but the earlier stages corresponded more closely with what is known as phagedenic ulcerative stomatitis. In the first case nothing in the man's history suggested a specific cause; in the second, the man's work as a tea-sorter may have had something to do with the causation, as sore mouth is not uncommon among workers in Indian teas. Masterman has heard of two tea-sorters in whom a very sore and swollen condition of the lips was the precursor of a rapidly fatal illness, and of one tea-taster who died with necrosis of the jaw.

Richards<sup>59
Apr. 15</sup> reports two cases of gangrenous gingivitis in adults, both proving fatal. The first patient had been taking small doses of potassium iodide.

Foot- and Mouth- Disease.—Grinan y R. Turró<sup>931
Mar.</sup> published an elaborate memoir on *Glosopeda*. As found in Spain, it is a highly contagious malady, and may affect not only the foot and mouth, but also the mucous membrane of the bronchi, stomach, and intestines, giving rise to symptoms resembling typhoid fever. This graver form is fortunately rare. The infection is transmissible from animals to man, but it is purely local, and does not reside in the flesh of the affected animals. G. Martorell y Rubí,<sup>613
Sept. 15, Oct. 15, 1902</sup> who likewise writes of foot- and mouth- disease in Spain, and insists on its communicability from animals to human beings, agrees with the

opinion that the flesh of infected animals may be eaten with impunity.

Tuberculosis.—Rethi¹¹³ has reported a case in which, after removal of a tooth and several roots from the mouth of a subject of pulmonary and laryngeal tuberculosis, the opening in the gum failed to heal, and perforation took place into the nares and maxillary antrum. The destructive process was stayed only by death. Histological examination showed the ulcerations to be tuberculous.

Heller⁴¹ reports a case of tuberculosis of the mucous membrane of the mouth. The disease had been considered syphilitic, but did not yield to antisyphilitic treatment. On inspection the uvula, the left tonsil, and the left palatal arch were seen to be covered with miliary nodules. The lungs were involved, but to such a slight degree that, in view of the long duration—one and a half years—of the buccal disease, the latter condition might be considered primary; if not primary, it must have made its appearance very early in the case. Lewin⁴¹ believes that tuberculosis of the mouth is more frequent than is generally supposed, and thinks that “the disease of the lungs may sometimes be secondary, just as tuberculous enteritis in children may follow tuberculous ulcers about the anus.”

Leukoplakia.—W. Erb³⁴ has collected 240 cases of this disease among many patients seen by him, and believes the lesions to be, as a rule, epithelial thickening, resulting from mucous patches. Only two cases were in women, both syphilitic. Four grades of the affection are recognized: 1. Very slight changes at the corner of the mouth, generally unilateral; a dull, dry appearance, with slight epithelial thickening. 2. Appearances more marked, thickening greater, white coloration. Similar small patches on mucous membrane of cheek, lips, and tongue. 3. More extensive patches, with intense white enamel-like appearance, on angle of mouth, in cheeks and lips. The tongue shows everywhere white opaline spots, and often small cracks; thin, minute, painful ulcers, which come and go. 4. Changes most marked in the tongue. The whole upper surface is smooth, shining, enameled in spots, the papillæ gone. In the largest proportion of cases the angle of the mouth, alone or together with some other part, was affected; the tongue alone in nine cases, the lips alone in three. In about 80 per cent. of the cases there was a clear history

of syphilis. In many of the other cases there was a strong suspicion of such infection. In four or five cases antisyphilitic treatment either cured or much improved the condition, even after it had existed a long time. Of 148 cases questioned as to tobacco-smoking, 47 smoked little, or not at all; 101 smoked moderately, 2 excessively. Syphilis alone occurred in 36 of these cases, smoking alone in 37, syphilis and smoking in 64, neither in 11. The conclusions are: 1. Syphilis or smoking alone may be the cause of this condition in about the same proportion of cases. 2. In the greater number of cases it is to be referred to both. 3. It appears very seldom without one or the other cause. Other irritants play only a minor part. In view of the number of syphilitics and smokers who never develop this affection, a certain predisposition must be assumed. [I have reason to think that gout is a cause of leukoplakia. I have seen it in gouty women, who did not smoke and were not syphilitic.—ED.]

Fournier ¹⁰⁰_{Nov. 29, '92} recommends cauterization with silver nitrate or the acid mercury nitrate in the treatment of mucous patches of the mouth. Strict hygiene should supplement the treatment.

Tumors.—Redard ⁷_{No. 16} removed a cystic tumor, the size of a pigeon's egg, from the mouth of a girl of 6 years. The cyst was situated two centimetres from the lingual frenum. Cornil, who made the histological examination, decided that it resulted from the inflammation and dilatation of a glandular duct. Bloch ⁸⁸_{No. 22} reports the case of a newborn child having upon the posterior portion of the left half of the soft palate a small tumor four centimetres long and two centimetres in breadth. Microscopically, the growth presented the structure of skin.

Salivary Calculi.—For five years Galippe ⁶_{No. 27} has been conducting experiments on the microbian synthesis of tartar and salivary calculi. He has succeeded in manufacturing out of normal saliva, saturated with carbonic acid, a considerable number of small calculous concretions of variable density, the organic skeleton of which is made up of a net-work of micro-organisms, the species varying according to the kind of concretion. Chemically, the calculi are composed of calcium and magnesium phosphates and carbonates, like those forming spontaneously in the mouth.

Oker-Blom ⁸⁸_{No. 22; Aug. 15} reports a case of salivary calculus of Stenson's duct, discharged by ulceration into the mouth of a man aged

57. There had been intermittent, painful swelling of the parotid and submental glands and a small ulcer on the cheek externally for twelve years.

Congestion of Gums.—J. W. Farlow⁹⁹ June 8 showed a young woman with marked congestion of the gums and some loss of the superficial epithelium. This condition had existed for about a year in spite of all treatment. A thin, transparent pellicle formed in places, an evident attempt at healing; but this was soon detached, leaving the gums in the same red and sensitive condition as before. The patient's general health is good; she takes excellent care of the teeth and mouth, and there is no disease of the teeth except slight Riggs's disease in one of the lower incisors. There is no evidence of an irritant in the food, tooth-powder, or anything that enters the mouth. There is no trouble with the stomach, bowels, or genital functions, and there is no evidence of lead, mercury, or arsenic in the system. She has been seen by many physicians and dentists, who say they have never seen such a case, and do not know to what to attribute it. Astringent, antiseptic, soothing, stimulating, mild and strong solutions have been used without benefit. Specific and all other internal medication have proved equally useless. Altemaire²⁴³ July reports a case of primary inflammation of the sublingual gland in a man of 21 years.

Epithelioma of Lip.—Gangolphe²¹¹ Oct. 9; Jan. 28 reports the case of a boy, aged 15, with an ulcer of the upper lip. There was no sign or history, personal or hereditary, of scrofula or syphilis. The disease had begun, eight months before, in a tiny ulcer on the middle part of the upper lip, which, according to the patient, had followed a wound inflicted by the claw of a cat. A scab formed, which the patient used to pull off, and the ulcer gradually spread and became deeper. The base was ragged and blackish in color, the edge raised and extremely hard. There was no discoverable glandular enlargement. The ulcer was freely excised, and the microscopical examination left no doubt as to the epitheliomatous nature of the lesion. At the date of the report, more than a year after the operation, there was no sign of recurrence.

DISEASES OF THE TONGUE.

Glossitis.—Rose²² Aug. 30 reported a fatal case of glossitis in a man aged 50 years. Suffocation had been averted by incision, which

healed by first intention; nevertheless death occurred on the fourth day in coma. There was albumen in the urine. There was neither œdema of glottis nor pulmonary infarct, but venous stasis in the meninges was observed. The liver was fatty. From the kidney were cultivated cocci similar to those found by Siegel in foot- and mouth- disease. In the discussion Siegel expressed the opinion that the case belonged to the same category as the cases described by him. In human foot- and mouth- disease the tongue was always swollen, but he had only seen 6 cases like the one described. Two patients died with symptoms of general septicæmia; 3 recovered without sequelæ; 1 recovered after most of the tongue had necrosed and fallen off. In the treatment of foot- and mouth- disease, sodium salicylate showed distinctly specific activity. McCulloch ^{Mar. 25} reports a case of apparently idiopathic glossitis in which relief, and finally recovery, followed wet-cupping over the neck. Wetmore ²⁸² _{May} reports a case of acute, circumscribed hemiglossitis, with suppuration.

Tuberculosis.—Chauffard ¹⁴ _{Feb. 26} presented a case of tuberculosis of the tongue with difficulty differentiated from gumma. The patient, a laborer aged 48 years, had probably contracted syphilis at 25 years of age, and in the autumn of 1891 gave evidence of pulmonary tuberculosis. The tongue was thickened anteriorly throughout a lateral half, mammillated, and covered with an abundant yellowish exudate. In the neighborhood of the median groove an irregular, grayish fissure presented the appearance of a ravine terminating posteriorly in a sort of crater. The entire anterior portion of the tongue presented semidiscrete miliary or submiliary nodules of a yellowish tint upon a base of smooth, reddish mucous membrane,—the highly diagnostic “yellow points” of Juillard. There was ulceration of the left labial commissure, and a small mobile ganglion at the angle of the jaw upon the same side. There was little or no pain. The state of the tongue forbade laryngoscopical examination.

Despite large doses of potassium iodide, the lesions increased in extent and severity; gumma would have healed. In syphilitic glossitis, moreover, the fissures are more numerous, more irregular, and less sanious than in tuberculosis. Treatment was palliative. Rendu observed that in a similar case applications of a 10-percent. solution of lactic acid had given good results.

Ulceration.—Wingrave ² _{Dec. 24, '92} exhibited a sharply-defined ulcer of the tip of the tongue in a man aged 50. The edge was somewhat elevated, but the surrounding tissues only slightly indurated. It had been observed during a period of ten years. The author thought it probably tuberculous, as antisyphilitic remedies gave no relief, and, although there was no family history of phthisis, the patient had lately lost flesh and suffered from diarrhoea; there was no definite sign of tubercle in the lungs. Hutchinson ²² _{Feb. 22} showed a man, aged 40 years, with papillomatous overgrowth associated with slight ulceration and some induration on the right side of the tongue. There was a remote history of syphilis. The appearances present were first noted five years ago. The man had never been a smoker, and a decayed tooth that had been a recent source of irritation had been removed. Hutchinson laid great stress upon the case as a typical instance of ulceration in a papillomatous growth of the tongue which, if left to itself, would become cancerous. The importance of early recognition and operation before glandular involvement was obvious. Recurrence never took place in the stump, but always in glands, and these might be infected, although no external evidence of their involvement could be detected.

Abscess.—Hélary ³⁷ _{Dec. '92} observed, in the service of Gougenheim, a case of circumscribed abscess of the base of the tongue in a male patient of 17 years. The condition had developed in the course of about a week, without known cause, slight pain having been first experienced at a meal, while swallowing a piece of meat. The symptoms were grave enough to threaten life, but the lesion was only discovered upon examination with the laryngoscope. Spontaneous evacuation at the moment of an intended incision was followed by recovery. Hélary calls attention to the infrequency of reports of similar cases.

Lockwood, of Lockeport, ²⁸⁴ _{Jan.} reports a case of unilateral abscess of the tongue in a man of 19 years. Spontaneous evacuation was followed by recovery. The cause of the abscess is unknown.

Tumors.—Reuss ²³⁶ _{Mar. 4} removed from the tongue of a male infant, aged 9 months, a flattish and somewhat knobby excrescence attached to the middle of the frenum by a broad, column-like pedicle, reaching to the tongue above and to the floor of the

mouth below. The tumor, which histological examination showed to be benign in character, and closely resembling the lingual papillae in structure, appeared not unlike a very broad wart. The author finds nothing similar in literature. Richl¹¹ _{Feb. 8} showed a case of angioma of the tongue in a patient aged 22 years. At an early age the growth was small and gave no trouble, but now it extended along one side of the organ, from the tip to the circumvallate papillæ. The changes appeared to have resulted from spontaneous thrombosis.

Macroglossia.—Henig⁹⁹⁶ _{Mar. 10} noted a semicretinoid condition in an infant with congenitally hypertrophied tongue. On removing with electro-caustic loop the protruding portion of the organ, the functional troubles in great part disappeared.

Leah² _{Mar. 15} had a case of enlargement of the tongue in a boy, aged 5 years, who, since birth, had suffered from some indefinite thickening under the tongue. When 2 years old he was tapped for ranula; inflammation followed, thickening remained, and speech was defective. The tongue was more than twice its normal size, and protruded three inches beyond the lips. A wedge-shaped piece was removed. Reverdin and Buscarlet¹⁹⁷ _{Nov. 20, 1911; Dec., 1912} report a case of macroglossia, developed from an angioma, in a child of 8 years. The tongue lay outside of the mouth, enormous and violet-colored, the lower lip being everted downward. At birth the child was perceived to have a black tongue, and a patch of the same color on the lower lip. Toward the age of 7 to 8 months the tongue began to grow, and at 3 years of age could not be contained in the mouth. The swelling of the cheek and lip had been more gradual. During the last year haemorrhages had occurred frequently. The child was in good health. The tumor could be seen developed in the anterior part of the tongue, which appeared to be healthy behind. It had a general violet-black color, with black points on a violet or rosy base. There was no pulsation. Six days after tying both linguals, two veins on the right side, one large vein on the left and the facial artery, the tumor of the tongue was removed. Some six months later the angiomas of the lip and cheek were found to have increased; electrolysis was employed with doubtful success, and operation was intended, but the parents ceased attendance. A slight return of the growth in the tongue was noticed. The histological examination by Buscarlet showed

the growth to be an extremely-developed and intra-muscular cavernous angioma.

Hairy (Black) Tongue.—Ciaglinski and Hewelki¹¹⁴ describe a case in which they were able to find in the black patch a mold somewhat resembling mucor rhizopodiformis, which contained black pigment. The patient was a woman, who, a fortnight previously, had had a feverish attack—most probably influenza. The tongue looked as if it had been covered with blacking, the discoloration extending as far back as the circumvallate papillæ. By means of borax washes the tongue became clean in a couple of days. The black mold could be well cultivated on bread or on potatoes at the temperature of the room, but did not grow at 37° C. (98.6° F.). It was apparently of a harmless character, for it was injected into the veins of rabbits without effect. Ciaglinski and Hewelki distinguished two kinds of black tongue,—the chronic, due to anatomical changes in the epithelial layer; and the acute, which depends upon the presence of a mold. This is apparently harmless to internal organs, as it does not develop at the temperature of the body. [I regret that there is no mention of the presence or absence of black deposit upon the teeth.—ED.]

Massin¹⁷ found, in his case of hairy tongue, colonies of micrococci arranged in zoöglear groups. Cultivation and inoculation were unsuccessful. He considers that the regularity of formation in the centre and the spreading to the periphery are against the parasitic origin of the affection. The coloring matter of the cells appeared to be more like that found in the corneous layer of the skin than that secreted by chromogenetic bacteria. The author would ally the affection with benign neoplasms, especially papillomata.

Lingui geographica.—Otto Spehlmann²⁰⁵⁷ reports twenty-three personal observations, and analyzes the literature of this subject. He concludes: 1. The *geographical tongue* (so called from the resemblance of the organ to a map) is an independent, benign affection, well differentiated from all other diseases of the tongue. The clinical picture is characterized by circumscribed epithelial desquamations, by disappearance and shifting of the altered patches, and by a chronic course. 2. The anatomical alteration consists in proliferation of lymphoid cells in the submucous connective tissue, and in the formation of an exudate in the superficial layer of the stratum

Malpighii, through which the outer epithelial layer is cast off. 3. The affection is an epiphomenon of organic diseases with consecutive disturbance of nutrition. 4. Therapy is as yet without result. Syphilis is only of "predisposing moment." Smoking has no part in the etiology of the affection.

Psoriasis.—Hutchinson relates a series of cases ⁸⁰⁶ _{Apr., July} illustrative of various conditions of the tongue. Among the most interesting are various examples of symmetrical, filmy patches (true psoriasis) from different causes, and instances of neuralgic pain in the side of the tongue, toward the base, probably due to gout. I have seen a number of cases of the latter condition, and, as with Hutchinson's patients, the dread of cancer has been a great source of anxiety to the sufferers. Hence the importance of being able to make a positive diagnosis.

Lewin ⁴¹ _{Sor. 14, '92} describes a case of what he considers a rare affection, namely, syphilitic psoriasis of the tongue. The patient was a young man. A large number of red, smooth spots seen upon the gray-coated tongue indicated loss of papillæ. Joseph, in the discussion, endeavored to establish a connection between this affection and leukoplakia.

DISEASES OF THE STOMACH.

Chemistry, Tests.—Experiments on dogs to determine the functions of the stomach led von Mering ⁴¹ _{Apr. 27} to the conclusion that the stomach is not an absorbing organ.

Hirsch. ³¹⁹ _{No. 181} in a series of experiments on dogs, found that inorganic acids left the stomach slowly, while organic acids were rapidly expelled. It is of importance to study the action of these acids on the intestinal mucosa. Salkowski ²⁰ _{V. 127, No. 3} has found, experimentally, that the amido acids exert an influence upon digestion. They are able to combine with HCl, but under favorable conditions do not retard fibrin digestion.

Quintard ¹⁴⁷ _{June} determines the rapidity of digestion by using gluten capsules containing a definite quantity of methyl-blue. Two hours after ingestion the urine is examined every quarter of an hour until it assumes a beautiful green color. Normally, this is observed two and a half hours after the ingestion of the capsule, while under pathological conditions the coloring matter does not appear until after from five to eight hours.

From the results of comparative observations, Opienski and Rozenzweig⁶⁷³ conclude that, for the detection of hydrochloric acid, Seeman's method is the most exact. For testing the reaction, litmus-paper must be employed, not solution of litmus. Sjöqvist's method is complicated, and not exact; Mintz's method has no diagnostic value; and they recommend only Seeman's method, which, in the same examination, gives the acidity of the stomach in general, the amount of hydrochloric acid, and of the fatty acids. (Report of Corr. Editor Drzewiecki, Warsaw.)

Slosse⁸⁶⁸_{Nov. 19, 92} makes use of capillarity to separate free hydrochloric acid from mixtures of HCl and peptones, in which no reaction can be obtained with phloro-glucin vanillin. He uses strips of Swedish filter-paper, of which one end is plunged into the liquid. After one-half hour to an hour, the paper is withdrawn and divided transversely into two or three fragments. Each one of these is placed in a capsule with a few drops of reagent and evaporated slowly to dryness, when the characteristic red color is produced. Control experiments with solutions of sodium chloride did not give the same result.

Hallopeau¹⁰⁸⁵_{Feb. 19} recommends the following procedure for the quantitative determination of peptone and syntonin in the gastric juice: *Peptone*.—To 10 cubic centimetres ($2\frac{1}{2}$ drachms) of gastric juice add 2 cubic centimetres (31 minims) of a 10-per-cent. sodium-acetate solution, then several drops of ferric chloride until the liquid is reddish-brown. Neutralize with sodium carbonate, avoiding an excess. Boil; then filter, after cooling. Wash the filter and the precipitate carefully with cold water. To the filtered liquid add an equal volume of a 10-per-cent. solution of mercuric nitrate, free from nitric acid. After a momentary agitation, let the solution stand until the precipitate of peptonate of mercury has settled. The supernatant liquid is thrown on a weighed filter; then the precipitate, which is washed with water until hydrogen sulphide ceases to produce a precipitate. The increase in weight of the filter dried at 106° to 108° F. (41.1° to 42.2° C.) represents the peptonate of mercury; this quantity, multiplied by the co-efficient 0.666, corresponds to the amount of peptone present. *Syntonin*.—10 to 20 cubic centimetres ($2\frac{1}{2}$ to 5 drachms) of gastric juice are accurately neutralized with sodium carbonate. The precipitated syntonin is collected on a weighed filter and washed with

cold water. The increase in weight of the filter dried at 105° F. (40.6° C.) represents the quantity of syntonin.

Stein⁸¹ has made a series of experiments to determine whether salol is absorbed from the stomach. It is generally held that its absorption takes place only from the intestines; upon this depends its use as a test of gastric activity. His conclusions are as follow: 1. Salol is absorbed from a completely-closed stomach, and its decomposition products appear in the urine. They cannot usually be demonstrated in the stomach contents. 2. Increased secretion of mucus in the stomach hastens the decomposition of salol, and the products can be found in the mucus. 3. The elimination of salol, given hypodermically, lasts about two days. It is, therefore, not permissible to judge that salol has already passed into the intestines when the reaction occurs in the urine; nor does the failure of the reaction to appear prove that there is pyloric obstruction.

Elsner,²⁰⁰⁸ in the course of a paper treating fully of the newer methods of diagnosis in diseases of the stomach, relates two cases in which the normal response to tests for secretion and motor activity enabled the stomach to be excluded from the possible sites of evident malignant disease of the abdominal viscera. One case proved, at autopsy, to be carcinoma of the pancreas, retroperitoneal glands, and omentum. The other, clinically, gave evidence of a mass connected with the right kidney, and by pressure almost occluding the duodenum below the ductus choledochus.

D. D. Stewart⁹,₁₅ reviews the modern methods of diagnosis in diseases of the stomach, and commends the gastrodiaphane of Einhorn. For free acids and acid salts he prefers Leo's CaCO_3 test. For free HCl he uses Günzberg's solution, according to Mintz's quantitative method. He considers the salol test, according to Ewald and Siever's method, useful in determining motor function. Penzoldt and Faber's iodide capsule is used to test the absorbent power. Cavallero and Riva-Rocci, ⁵⁸⁹,_{Mar 23} from experimental studies, are led to conclude that Winter's chlorimetric method is accurate, and suffices for scientific and practical researches. On the other hand, Sansoni,⁵⁸⁹,_{Apr 6} from a careful series of examinations, concludes that Winter's method for the estimation of hydrochloric acid in the gastric contents is fallacious. The variability of individual gastric chemism in disease, and the impracticability and thera-

peutic error of divisions into hyperacid and subacid types, etc., are well illustrated by a case reported by Linossier and Lemoine.⁹²

Boas⁶⁹ makes mention of the occasional presence of H₂S in the gases eructated from the stomach, or contained in the material secured with the stomach-tube. His observations are summed up as follows: The formation of H₂S is not rare; aside from acute gastric catarrh and of communication between the stomach and the bowel, it occurs most frequently in gastric dilatation. The production of H₂S is, as a rule, the result of abnormal albuminoid decomposition; it is possible, however, that alkaline sulphates, administered medicinally, may give rise to H₂S. Just as fermentation of carbohydrates can proceed in the presence of abundant HCl, albuminoid decomposition is likewise not prevented by the acid. Quantities of H₂S produced in gastrectasia are so small that symptoms of intoxication do not arise. H₂S does not, as a rule, appear in the urine. The test for the gas is made with lead-acetate paper.

Rosenheim⁶⁹ has had the opportunity of studying the case of a woman, aged 48, in whom resection of the pylorus had been performed on account of cancer. He found that one and one-half years after the operation the stomach preserved its normal motor power, but that HCl was absent from the gastric juice,—probably, he thinks, from the irreparable damage done to the secretory glands by the cancer.

Gastric chemism, absorbent and motile power, the different tests and their clinical values form the subject of many other papers, among which we may refer to the following: Mathieu and Hallopeau,³⁶⁰ Friedenwald,¹ von Mering,¹⁶⁹ Elsner,¹ Löwenthal,¹ Bozzolo,⁵⁸⁹ Mathieu,¹⁰⁰ Gillespie,³⁶ Honigmann,⁴ Strauss,⁴ von Noorden,⁴ Ewald,⁴ Stockton,⁹ von Engelhart,²¹ and MacDonald.¹⁰⁵

Algesimeter.—By means of a pad and spring, Boas³⁴ applies measured pressure to determine the relative sensitiveness over the epigastrium. He places the normal tolerance at 9 to 10 kilogrammes (18 to 20 pounds). In cases of gastric ulcer pain was complained of at 1 to 2 kilogrammes. When 5 to 6 kilogrammes (10 to 12 pounds) can be again tolerated, the ulcer may be considered to be healed. Gaus⁴¹ believes that Boas's algesimeter is useful in the diagnosis of gastric diseases, especially in differentiating between ulcer and other conditions.

Glénard's Disease.—Max Einhorn ¹ _{Dec. 10, '92} read an interesting paper on enteroptosis, or Glénard's disease. After a clear exposition of Glénard's views, Einhorn demonstrated, by means of the gastro-diaphane, some of the conditions found in the disease. Several patients were shown who were suffering from gastrophtosis, with or without dilatation. The luminous outlines of the stomach made very evident any changes in its size, shape, or position. Einhorn did not indorse all of Glénard's statements, but believed in giving him credit for calling attention to the condition of enteroptosis, whether his explanations of that condition were correct or not. Montenuis, ²²⁰ _{Aug. 25} describes the clinical forms of enteroptosis, or Glénard's disease. While each case may be a special variety, there are five principal types, termed by the author (1) asthenic, (2) entasic, (3) dyspeptic, (4) neurasthenic, and (5) neuropathic.

Reichmann's Disease.—Riegel ⁶⁹ _{Nov. 21, '92} discusses supersecretion of the gastric juice. There are two forms,—the acute (generally of nervous origin) and the chronic. The latter is seen in emaciated persons; the stomach is dilated and succession-splash is readily obtained. The diagnosis is made in part by examination of the gastric contents, which are removed five to six hours after the meal. The quantity will be found large. On standing, the material becomes separated into three layers,—an upper, frothy layer; a middle, turbid, yellowish layer; and a lower, consisting of starchy matter.

In order to determine that supersecretion exists, the stomach contents are removed in the evening, and the viscera washed out thoroughly until the water is no longer acid in reaction. The patient receives no food until the next morning, when, after the proper interval, the contents of the stomach are again evacuated. From 30 to 600 cubic centimetres (1 to 19 ounces) of fluid will now be obtained, which, on examination, proves to be active gastric juice. The disease is chronic. Diet, lavage, alkalies, and antiseptics, like salicylic acid, constitute the treatment.

Thayer ⁷⁰⁴ _{Dec. 7, '92} exhibited a man, aged 40 years, with dilatation of the stomach, who had much emaciation, and whose gastric symptoms were found to be due to supersecretion of highly-acid gastric juice. Treatment consisted of highly-albuminous diet, daily morning lavage with alkaline solutions, and administration of sodium bicarbonate in small quantities every two hours while

awake. As to diet, there were four main meals in the day,—at 8 A.M., 12 M., 4 and 8 P.M. At each meal he had meat, fish, or eggs in moderate quantities, a slice of toast, or a cracker and good butter, and at two or three of these meals a small cup of black coffee. Every two hours between meals he was given either a hard-boiled egg or a glass of milk, beef-tea, beef-juice, egg-albumen, or something of that sort. He drank only soda-water, not more than thirty cubic centimetres at a time. In the discussion Osler reported the complete recovery of a similar case under his care two years earlier. The man had wasted almost to a skeleton, and had been told that he had malignant disease of the stomach.

Auché⁷⁸⁰ Jan. records two cases of gastric supersecretion of intermittent type. In the case of a married woman, aged 24 years, convulsions, left hemianesthesia, anaesthesia of the pharynx, concentric retraction of visual field, and left ovaralgia were associated with the dyspeptic condition. In the case of a wine-dealer, aged 39 years, who had had crises at irregular intervals for ten years, great relief followed treatment, but as the attacks had previously subsided spontaneously or upon drinking of Vichy water, the cure is not considered definitive.

Ulcer.—West² Apr. 8 reports a number of cases of chronic or latent gastric ulcer with grave sequelæ: 1. A man, aged 34 years, whose first symptom had been haematemesis, eighteen months previously was admitted to hospital with gangrenous abscess in the left loin. Incision, irrigation, and drainage failed to save life. The necropsy showed a general suppurative peritonitis due to perforation of a pyloric ulcer. 2. A woman aged 22 years was admitted with symptoms pointing to suppurative peritonitis consecutive to perforation of gastric ulcer, but, the abdominal symptoms subsiding while hectic fever continued, cough developing, and a patch of dullness being found at the left base, empyema was suspected. No pus was found in the chest upon exploratory puncture. At the necropsy there were found general suppurative peritonitis, suppurative pylephlebitis, and a dense mass of adhesions surrounding a perforation of the lesser curvature. No communication with the peritoneum existed. 3. A woman aged 43 years had been in good health until seized with violent epigastric cramp, a month before admission into hospital, almost moribund, the only diagnosis possible being “a general septic state, possibly with clots in

the lungs." Necropsy showed two chronic ulcers, one each in the stomach and duodenum, the latter having given rise to an abscess, which opened into the transverse colon. 4. A man aged 46 years was admitted into St. Bartholomew's Hospital with the diagnosis of chronic intestinal obstruction. Symptoms pointed to gastrocolic fistula, but were not urgent until suddenly fecal vomiting occurred, and was repeated at varying intervals for a fortnight. Exploratory incision did not reveal the cause of the symptoms. Two days later the patient died. At the necropsy the transverse colon was found to be adherent to the greater curvature of the stomach, communicating with that organ through a ragged hole three-quarters of an inch in diameter, which proved to be the centre of a large ulcer, evidently malignant. Microscopic examination showed the tumor to be medullary carcinoma.

Thiroloix and du Pasquier⁷, report from the service of Lanceriaux the case of a man, aged 38 years, who died of marasmus, after having been under observation for nearly a year, during which there had been excessive and abundant vomiting, boulimia, hyperchloracidity, crises of tetany with feebleness and slowness of pulse and subnormal temperature, simple polyuria, polyuria with albuminuria, and mental failure. The necropsy showed an enormous dilatation of the stomach, with fibrous stenosis of the pylorus and the upper portion of the duodenum, originating in cicatrization at the site of two simple ulcers. Colgan⁸,⁹ reports a gastric ulcer in a child of 2½ years. Hoggan¹⁰,¹¹ June 15, reports a case of two acute ulcers of the stomach in a child of 5½ years, the lesions having apparently resulted from a kick by a horse.

Germain Séc¹², Sept. 20, publishes a lecture on the forms and diagnosis of gastric ulcer, which admirably summarizes the present state of knowledge. Anson¹³, Mar. 4, reports a fatal case of perforation of the stomach in a girl, aged 20 years, who had for some eighteen months previously been "run down" and "dyspeptic" without symptoms certainly indicative of gastric ulcer. A point in diagnosis was the obliteration of liver dullness after distension of the abdomen had occurred; this being due, as Sehn points out, to extra-intestinal gas driving the liver back and separating it from the diaphragm. Operation was done and the perforation closed, but the patient died thirty-six hours after the onset of symptoms. Blankenhorn¹⁴, Apr. 15, reports a fatal case of perforation of the stomach

simulating intestinal obstruction in a cooper aged 55 years; death took place on the sixth day after the sudden onset of symptoms.

Letulle⁷ found but one instance of tuberculous ulceration of the stomach in one hundred and eight necropsies of subjects of pulmonary tuberculosis. The stomach presented a dozen little tumors about the size of a pea, and mostly ulcerated at the summit. Microscopically, the tubercles proved to be submucous in origin, and there was likewise found submucous infiltration penetrating between the gastric glands, forming an embryonic connective tissue rich in vessels and in giant-cells. Bacilli were not abundant. Rémond¹⁰⁸⁸ Sept. 24 reports a case of tuberculosis of the stomach, the lesion being located at the pylorus. The literature of the subject is also reviewed. To show how perforating gastric ulcer may be recovered from, Norman exhibited¹⁶ Apr. the stomach and liver of an old woman dead of consumption. At a site marked by a firm old cicatrix, the stomach was adherent to the small and hard left lobe of the liver. There was no indication of old general peritonitis. Casado⁶¹³ May 15 reports a number of cases illustrative of the possibility and the benefit of long-continued and exclusive rectal alimentation in ulcerative and erosive affections of the stomach. He considers firmness and decision on the part of the physician the most important factor in treatment. [In a case of obstinate haematemesis in gastric ulcer recently under my care at the Philadelphia Hospital, exclusive rectal alimentation was continued with benefit for six weeks. But small quantities could be injected, as the rectum was irritable. At first 2 fluidounces (62 cubic centimetres), later 3 fluidounces (94 cubic centimetres) of predigested milk or beef, thickened with egg-albumen, were given twice daily. By the mouth, ice, lime-water, soda-water, and rarely champagne were permitted in small quantities. It was found that occasional inexplicable attacks of haematemesis were due to food surreptitiously obtained from visitors. When this was prevented, recovery proceeded uninterrupted.—ED.]

Dilatation—Roberts¹⁰⁷⁷ May 24 lectured upon a case of gastric dilatation in which no cause for the condition could be made out. Systematic lavage had been remarkably beneficial in treatment.

Aufrecht³¹⁹ No. 23 describes two new diagnostic signs in the examination of dilated stomachs. 1. *Change of percussion tone*. In the midst of the extended area of tympany, on protracted per-

cussion there will be found a small circumscribed area of dullness. Continuing to percuss for some seconds, the dullness will give way to tympany, while another spot will have become dull. At times one can trace the progress of the dullness from the cardia to the pylorus. The author attributes the phenomenon to contraction of the hypertrophied musculature excited by presence of ingesta and subsequent relaxation. 2. Clinking percussion tone (*Klirrende Percussion*). This sound, somewhat similar to the cracked-pot sound obtained over lung-cavities, is best elicited following the change of percussion tone in the area that has become tympanitic, and is believed to be due to the impact of the gaseous contents of the stomach against a portion of the stomach-wall in the process of relaxation.

Devay ²¹² July 10 calls attention to the relations existing between dilatation of the stomach and certain psychical disturbances. He believes that the latter are analogous to puerperal psychoses, in the fact that they are the result of an auto-intoxication of the system. In those predisposed, dilatation, with the absorption of poisons of fermentation, produces a peculiar type of alienation; while in those already insane it leads to a change in type, usually to hypomania.

The treatment consists in securing gastro-intestinal antisepsis by naphthol preparations, with lavage, if possible. For the intestines naphthol and magnesia are useful.

Rupture.—A case of spontaneous rupture of the stomach in a woman, aged 74 years, who for several years had suffered from lateral curvature of the spine, and had frequent attacks of indigestion and tympanites, is reported by James Collins, of Philadelphia. ⁷¹ Aug. On the morning of her death she seemed to be quite active and well, and her mental faculties were unusually bright. About 4 o'clock in the afternoon she complained of some indigestion and discomfort; these symptoms continued for about two hours, when she sent for the physician, who found considerable distension of the abdomen and tympany. Suspecting bowel obstruction, attempt was made to afford relief by antispasmodics and gentle purgatives. About an hour later the sound of an explosion within the abdomen attracted the attention of those present. This was followed by rapid collapse and death.

Necropsy.—“The patient was emaciated, and the muscular system was weak. On opening the thin abdominal walls, a large

quantity of gas escaped. About one-third of the length of the upper end of the small intestine and the stomach were dilated. At the lower distended portion were found two hard little lumps of undigested matter which had been caught in the narrow part of the small intestine. Below this point the intestines were flaccid, small, and empty. Above the point of obstruction the intestines were distended about two inches in diameter. The stomach had collapsed. Examination showed that about two inches from the pyloric end of the stomach a rupture had occurred about two inches long. At this point the stomach-walls were very much distended and the tissues atrophied. At the further point of the rupture a small perforating ulcer was detected. The contents of the stomach had escaped into the abdominal cavity, causing peritonitis. What attracted the attention, however, was the inclination of the axis of the stomach, the œsophageal end being drawn upward, and the whole body of the stomach crowded over into the space caused by the lateral curvature of the spine, making the stomach axis very oblique, the pyloric end drawn downward. The other organs were normal."

J. W. Groff¹⁹ verified by necropsy his diagnosis of traumatic rupture of the stomach in the case of farmer, aged 50 years, temperate and frugal, who had been kicked in the abdomen by a horse. The patient, who had been able to walk a distance of one hundred and fifty yards to his house, was seen one and a half hours after the accident, lying upon his right side with extremities drawn up, and in the utmost agony. A few drops of blood about the umbilicus was the only external evidence of injury. There was vomiting, but the material was ejected without force. Shock was profound, and the pulse scarcely perceptible. Death occurred about sixteen hours after injury. The contents of the stomach were found free in the abdominal cavity. The intestines were uninjured. In the stomach was found "a large, irregular opening, two inches long, transverse to the lesser curvature, more on the anterior surface, and nearer to the pylorus. All the coats of the stomach were completely divided, except a few thin meshes of serous coat over the wound." The omentum and neighboring parts were deeply congested. There was considerable serous effusion in the peritoneal cavity, and increased fluid in pleural sacs and pericardium. An editorial comment upon the case suggests

that section should have been done, with repair of the opening in the stomach and hot irrigation and drainage of the peritoneal cavity. The patient might have recovered, and in any event could have died but once.

Fulton¹⁰⁵ Jan. 15 reports a case of rupture of the œsophageal end of the stomach in a child about a year old. The colon was enormously distended and its walls much thickened. When 3 months old the child had such great distension of the abdomen that the bowel was punctured in order to evacuate the gas. Wunschheim⁸⁸ Nov. 3 reports a case of rupture of the stomach. The patient had cancer of the œsophagus which ruptured into the aorta. The rent in the stomach was due, the writer thinks, to distension of the organ with blood.

Tumors.—The latency of gastric carcinoma is illustrated by a case reported by Collinet, from the service of Huchard,⁷ Nov. 22 which is also interesting, as having occurred in a woman of but 35 years of age. The growth was situated on the lesser curvature, at the junction of the right two-thirds with the left third. It was about the size of a franc. It had given rise to secondary growths in the liver, with enlargement of that organ, at first mistaken, during life, for an hydatid cyst on account of the age of the patient and the absence of cachexia and of emaciation. Puncture obtained a sanguineous fluid with cellular elements resembling hepatic cells undergoing granular and fatty degeneration. Death occurred with symptoms of cholæmia.

Lauenstein⁶⁹ Sept. 21 exhibited a preparation taken from a woman, aged 53 years, who had died of what was called cholera, though no bacilli could be found, and on whom two and a half months previously he had successfully performed gastro-enterostomy for carcinomatous stricture of the pylorus. The fistula was permeable, the tumor had made no progress, and the patient had steadily increased in weight and strength until the acute infection (cholera or cholericine) occurred. Brannan⁴⁹² June reports a case of amyloid disease of the liver dependent upon cancer of the stomach.

Allen J. Smith publishes an interesting study⁴⁵¹ Sept. of the paths and methods by which metastasis takes place in cases of primary carcinoma of the stomach. Ely⁵ Nov. 21 records a case of metastatic cancer of the stomach, the primary growth having been in the testicle. Girode and Chaput⁷ Nov. 22 report a case of cancer of the

stomach associated with tuberculosis of the lungs and the intestines. There had been diarrhoea during life, which phenomenon, unusual in gastric cancer, was explained by the post-mortem discovery of tuberculous ulcers in the intestines. Smith²², June 7, believes that in malignant diseases of the viscera the temperature is usually subnormal, with occasional rises to 100° and 101° F. (37.8° to 38.3° C.). Lépine¹⁴, Sept. 24, calls attention to his former observation of the distinction between the condition of the blood in cases of pernicious anaemia and gastric cancer. In the latter the haemoglobin value of the corpuscles is reduced, perhaps, one-half, while in the former it is conserved or even augmented. He regards this difference as absolutely diagnostic, unless there is a complication of the two conditions.

Ebstein²¹³, Dec., '92, reports a case of rapidly-growing sarcoma of the stomach in a man of 22 years. Secondary nodules were found in the peritoneum and in one of the kidneys; a degenerated, sarcomatous mass was situated between the right auricle and right ventricle.

Norman¹⁶, Apr., exhibited a peculiar specimen of gastric adenoma from the body of an idiot 34 years old. There had been no symptom referable to the stomach, the mucous membrane of which was everywhere thickened, and presented all varieties of polyposis from large dendriform projections to small wart-like growths. In the larger polypi the epithelial tubes penetrated beneath the *muscularis mucosae*.

Bœuf⁵⁶⁸, Mar. 4, records a case of cirrhosis of the stomach in a woman aged 49 years, the subject of pulmonary tuberculosis.

Neuroses.—Stockton⁴⁰, July, divides the motor neuroses of the stomach into the following classes: (1) excessive peristalsis; (2) deficient peristalsis; (3) spasmoid closure of the cardia or pylorus; (4) relaxation of the cardia or pylorus; (5) merycism (r rumination); (6) vomiting.

Soupault²⁰¹², No. 23, has carefully studied the subject of neurotic dyspepsia. He divides the symptoms into two groups,—hypersthenic, or dyspepsia with exaltation of function, and asthenic, or dyspepsia with diminution or suppression of function. By careful attention to the rational symptoms one may arrive at a diagnosis without resort to chemical analysis.

Geigel and Abend⁴¹, May 15, in a study of the gastric juice in nervous dyspepsia, found that there is generally a relative hyper-

acidity, but that the total quantity of HCl is rather diminished; whence it follows that the gastric juice is too concentrated. Without considering the latter condition causative, they nevertheless believe sodium bicarbonate useful in small doses.

A peculiar neurasthenic condition of the digestive tract as a sequela of influenza is reported by Lévy.^{100 June 17} The patient, after an initial attack of *la grippe*, lost greatly in weight, became pale, suffered from diarrhoea and vomiting, a great irritability, oesophagismus, and a peculiar loss of the sense of taste. No organic lesion was discoverable, nor were any of the ordinary hysterical stigmata present. The patient altogether lost 27 kilogrammes (60 pounds). Recovery, however, took place eventually, without medication.

Wallet⁶⁴ reports a case in which, by persistent refusal to eat, and the taking of vinegar, a girl, aged (at the beginning) 12½ years, reduced herself, in the course of two years, to a condition of great emaciation, her weight falling from 111 pounds to 80 pounds. Hydrotherapy, combined with the use of the stomach-tube for feeding, caused slight improvement.

[In an unreported case under my own care—that of a trained female nurse, unmarried, aged 28 years—the symptoms of irregular temperature, sometimes high (103° F.—39° C.), frequently sub-normal (96° F.—35.6° C.) for days (deception being carefully guarded against), profound anaemia, excessive feebleness, and progressive emaciation were made to disappear after some six weeks' rest in bed, with external heat, lavage, followed by forced feeding, and general massage. Points of interest in the case are that, owing to the coated tongue, elevation of temperature, prostration, abdominal pain and distension, the case was sent into the Poly-clinic Hospital as one of typhoid fever; and that the patient enjoyed the passage of the stomach-tube, and the sensation of the entrance and presence of the warm water or warm fluid food in the stomach.—Ed.]

Katz^{57 May 21} doubts if the symptoms of chronic gastro-intestinal disorders can be attributed to auto-intoxication. The latter does not explain the cyclical course of the phenomena. He looks upon them as reflex conditions excited by irritation of the vagus-sympathetic net-work. Fliesburg^{105 Feb. 1} reports a case of singultus which terminated fatally in nine and a half hours. The cause of the attack could not be ascertained, no autopsy being held.

Snow¹,_{July 1} reports the case of a girl of 8, of neurotic parentage, who had curious attacks of vomiting for several years, occurring at intervals of about six weeks. The vomited matter was highly acid, and there was a burning sensation in the stomach. At other times her digestion was good. Potassium bromide and chloral by the rectum proved useful. Holt¹,_{July 1} reports a similar case, in which he observed that during the attacks the uric-acid-urea ratio sank to 1 to 150, being in the intervals 1 to 40. The exclusion of sugars and the limitation of starches effected a cure. Christopher¹,_{July 1} observed a case in an adult, in which the successful treatment was the opposite of Holt's. Seibert,¹,_{July 1} in some cases, found that an accumulation of feces in the ascending colon was responsible. Forchheimer¹,_{July 1} had seen a number of cases and inclined to the belief that, owing to impairment of the filtering function of the liver, toxalbumens were present in the blood.

Allehin¹⁰⁷⁷,_{Sept. 29} doubts the propriety of attributing haematemesis to gastric ulcer, because no other cause can be found. He calls attention to its occurrence with pulsating aorta, and in cases in which, at autopsy, no lesion of the surface can be found. He refers to Pringle's case of coincident attacks of haematemesis and urticaria as supporting the neurotic theory. [At the Pan-American Medical Congress I called attention to the frequency of haematemesis and other hemorrhages in the condition I have termed vasomotor ataxia.—Ed.] Singer,³¹,_{Aug. 1} from a study of four cases of rumination in man, draws the following conclusions: Rumination is an expression of a neurotic constitution; its immediate cause is a relative insufficiency of the cardiac orifice, which occurs at intervals and with reference to certain contents of the stomach. Its mechanism consists in an aspiration of the stomach contents during a period of rarification of the air in the chest, produced by an inspiratory position of the thorax and simultaneous closure of the glottis. Rumination can be suppressed by expiratory movements. It should be separated, both physiologically and clinically, from the act of vomiting. The anomalies of secretion that are present are the consequence of the same neurosis which is at the base of rumination; they must be treated symptomatically, while the basal neurosis demands special treatment.

Nacke¹⁰⁹,_{Mar.} describes his personal history and symptoms. When about 30 years of age he became neurasthenic through excessive

mental strain; for about ten years since he has been subject to rumination occurring periodically in close relationship with the degree of his nervousness. Increase of the latter is the most powerful of all conditions that induce or aggravate the merycismus. Eating quickly, or less sparingly than usual, always gives rise to the condition. As a rule, a quarter or half an hour lapses before regurgitation begins, and it then recurs until the food is finely divided. No change in the flavor of the regurgitated food takes place, consequently Nacke excludes superacidity or other abnormal chemical state. He suggests that paresis of the cardia, with morbid irritability of other parts of the stomach, due to neurasthenia, may be causative factors in his case. Linossier and Lemoine^{July 16} made a careful study of the gastric juice of a soldier suffering from merycism and found it very variable. It would have been impossible to judge rightly from one examination, and they say that several determinations should be made in every case.

Gastritis.—Hayem^{May 14} classifies chronic gastritis into three varieties: (1) hyperpeptic gastritis; (2) atypical gastritis; (3) mucous gastritis. The first variety presents a regular evolution, comparable to that of parenchymatous nephritis. It is characterized essentially by irritation and hypertrophy of the cellular elements of the glands; there is not only multiplication of the pre-existing peptic epithelia, but at the same time elements similar to these appear in places where such do not normally exist. This process has two stages, that of inception and that of establishment. The third or terminal period is one of sclerosis, characterized by regression and atrophy of the glandular element and of the mucous membrane. Hyperpeptic gastritis is often mistaken for a neurosis; but neuropathic dyspepsia, according to Hayem, is a rarity. The affection progresses slowly, and is amenable to treatment in the early stages.

Dubois^{May 15}²¹⁴ considers gastric catarrh, in most cases, a misnomer. Dyspepsia may be due to disturbance of circulation or be associated with various forms of constitutional disease. Frequently, however, no organic cause is demonstrable. It is nervous dyspepsia. Anorexia, dysphagia, diarrhoea, and constipation are frequent concomitants of indigestion in these cases. Examination for acidity and the like does not aid in the diagnosis. The inexplicable anorexia and the general symptoms are more important. The Weir Mitchell rest-cure is the best treatment.

Regarding the dyspepsia associated with pulmonary tuberculosis, Hayem³¹, July 25, states that it is generally due to the ordinary causes of gastric inflammation. It is generally accompanied by delayed digestion, and, in consequence, by dilatation of the stomach. It may precede by several years the appearance of the tuberculosis, and is only aggravated by the onset of that disease in those who take powerful medicaments (*gastritis medicamentosa*) or live improperly. Neither the symptoms nor the pathology is peculiar. In one case he observed a generalized amyloid degeneration of the gastric mucous membrane; a tuberculous ulcer is exceptional. The treatment of the gastric condition is very important; in those predisposed this may prevent the development of phthisis. In certain subjects this treatment may even arrest a beginning tuberculosis.

Miscellaneous.—Fürbringer⁴¹, April 10, calls attention to a functional disorder of the stomach which he terms stomach weakness. There is no diminution in the appetite; but any indiscretion in diet, or a large meal, is followed very soon by gastric pain of a gnawing, yet not severe, character. This pain, while not intense, is yet depressing to the patient. There are no symptoms of gastric catarrh; the condition is simply an hyperesthesia of the sensory nerves of the stomach. Special articles frequently elicit pain: thus act sugar, fat, and starches in the order given. Food improperly masticated, in many of these cases, calls forth an attack of distress. Coffee is not well borne, but the milder alcoholic beverages and, above all, water are. The etiology of the condition is not clear, but high living, heredity and adult life, and influenza play a rôle. The treatment consists in the regulation of the diet, in the use of mild stomachics, and of baths.

Cortial²⁴³, July, reports two cases presenting grave cerebral pneumonia as the result of indigestion. Both were young adults. The first case fell unconscious in the street; the second had violent epileptiform convulsions. The condition is most often observed among soldiers on the march. The diagnosis from heat-stroke may be made by the character of the respiration, which, in indigestion, is not affected, and also by the presence of distension of the stomach and tenderness on pressure. Bleeding, with derivation by bowels and stomach, is indicated.

Eisenlohr⁶⁹, Dec. 8, 1922, records a case of grave anæmia dependent upon

atrophy of the mucous membrane of the stomach and the small intestine. The patient had also presented special symptoms,— paresis, and increased muscular tension of the lower limbs; the knee-jerks were absent. The autopsy revealed, in addition to the changes in the digestive tract, degeneration of the lateral and posterior columns of the spinal cord.

Cuffer¹⁴ calls attention to the importance of studying thoroughly all cases presenting atony of the stomach, as this may be an early symptom of interstitial nephritis, of organic nervous diseases, of tuberculous meningitis and other serious affections. Two forms of atony should be distinguished: a flatulent and a liquid form. The latter, characterized by vomiting or diarrhoea, points to inflammatory changes, while the former is usually of nervous origin or associated with anaemia or convalescence.

Mathieu¹⁰⁰ inveighs against the use of the corset, which produces displacement of the stomach, sharp pains coming on three or four hours after eating, displacement of the right kidney, etc. If the corset cannot be suppressed, it should at least be modified.

Therapeutics.—S. S. Cohen¹¹⁹ in discussing the question of diet in dyspepsia, advises against a too strict and too complicated regimen. Due regard should be paid to the patient's age, occupation, environment, and experience with various articles of food. In cases of lithæmia the quantity of meat and of starches should be reduced. The former should not be fried. Of starchy foods, the least objectionable is rice. Oatmeal is indigestible, and should be interdicted. Of fats, butter and beef-fat are best adapted for dyspeptic states. Milk is highly recommended. It should be swallowed slowly. In many cases its toleration by the stomach can be favored by adding 2½ grains (0.16 grammie) of pancreatic powder and 7 or 8 grains (0.5 grammie) of sodium bicarbonate dissolved in an ounce of water to each tumbler of milk at the time of taking. In many non-gouty cases intestinal digestion is at fault; here the starches and fats must be restricted. Lavage in chronic catarrh of the stomach, while useful, is not employed at Cohen's clinic so frequently as in previous years. An excellent substitute is found in the drinking of a glass of hot water an hour before meals.

Dubois²¹⁴ recommends the following *régime* in disturbances of digestion of nervous origin: Rest in bed and isolation for about a month, absolute milk diet for six days, then mixed diet, with

milk at 10, 4, and 9 o'clock. Functional disturbances of the intestines with constipation are best treated without medication, after the following plan: 1. Rising at the same hour every morning. 2. A glass of cold water or an infusion of quassia, if the patient must have medicine. 3. Breakfast at $7\frac{1}{2}$ A.M., with Graham bread and butter. 4. Going to stool precisely at the same hour daily, e.g., at 8 A.M. 5. Ingestion of abundant food at each meal, giving preference to vegetables and fruits.

Von Noorden¹⁷⁵ cautions against too great depression of metabolism by long-continued dietary restriction in stomach diseases. When general nutrition is poor, the patient must rest in bed, and be given concentrated nutriment, with sufficient fatty material to conserve normal heat production. As example of a bill of fare, restricted but nourishing, he gives the following: Milk, 1250 grammes (1 quart); meat-broth, with eggs, 10 grammes ($2\frac{1}{2}$ drachms); butter, 50 grammes ($1\frac{1}{2}$ ounces); toast, cakes, 70 grammes ($2\frac{1}{2}$ ounces); butter, 15 grammes ($\frac{1}{2}$ ounce); broth made of 30 grammes (1 ounce) tapioca meal, 1 egg, 10 grammes ($2\frac{1}{2}$ drachms) butter. As a nourishing and little-irritating diet, he suggests: Tender meat, 250 grammes (8 ounces); cocoa, 20 grammes ($5\frac{1}{2}$ drachms); 3 eggs; 100 grammes ($3\frac{1}{4}$ ounces) zwieback; 100 grammes ($3\frac{1}{4}$ ounces) fine wheat-bread; 50 grammes ($1\frac{1}{2}$ ounces) cakes; 50 grammes ($1\frac{1}{2}$ ounces) butter; 40 grammes ($1\frac{1}{2}$ ounces) tapioca meal; 40 grammes ($1\frac{1}{4}$ ounces) Indian meal; 20 grammes ($5\frac{1}{2}$ drachms) sugar; 1250 grammes ($1\frac{1}{4}$ quarts) milk. In cases of subacidity he gives small doses of hydrochloric acid fifteen minutes before meal-time, less as a digestive agent than as an appetizer. Bitters may be given for the same purpose.

Rabbits usually thrive on a milk diet, but Charrin¹⁴ has observed, in a number of these animals submitted to an exclusive régime of milk, a fatal disease characterized by emaciation, asthenia, diarrhea followed by constipation, polyuria with increase of urea, and in some cases with slight albuminuria. Fever is exceptional, hypothermia not uncommon. In some cases ulcerations and abscesses of the integument have developed. Intestinal congestion, with inflammatory infiltration of all the tunics, atrophy of viscera, with granules of pigment in the hepatic and renal epithelia, are the constant lesions.

Bovet¹¹ eliminates meat from the diet in hyperchlorhydric

dyspepsia. He uses the alkalies in moderate doses. Huchard¹⁴_{Nov. 27, 1900} advises the use of meats, restricting the starches and vegetables. The alkalies he employs in doses of from 20 to 30 grammes ($\frac{2}{3}$ to 1 ounce) a day.

A. B. Stork¹⁰⁶_{Jan.} describes a form of flatulent dyspepsia attributed to the excessive heat of summer. Irregular action of the heart is a cause of dread to the patient. Regulation of diet, cold sponging, reduction of fluids ingested, and antiseptic medication bring about recovery. Digitalis is sometimes used to steady the heart.

Löwenthal⁶⁹_{Aug. 21} is inclined to doubt the existence of a distinct neurosis manifesting itself as an hyperesthesia of the gastric mucous membrane toward HCl, as is claimed by Talma and Myling. In the cases described by these authors the presence of an ulcer or of supersecretion cannot be excluded. In sub acidity Löwenthal has had good results from irrigation (Berieselung) of the stomach with 0.6-per-cent. salt solution. In supersecretion and in hyperesthesia, irrigation with a 1-per-cent. solution of silver nitrate proved useful.

D. D. Stewart⁸⁰_{Feb. 15} considers pepsin absolutely inutile. He commends lavage, the administration of dilute hydrochloric acid, and direct electrization of the stomach in cases of catarrh with deficient secretion. Einhorn²⁰⁰⁸ relates his further experiences with direct electrization of the stomach, both galvanic and faradic. Of forty-two cases, but two failed to be benefited. He concludes that: "Direct gastro-faradization ordinarily increases gastric secretion, even during the first period after electrization. The absorbent faculty of the stomach is considerably accelerated directly after the gastro-electrization (faradization and galvanization). Direct gastro-electrization is applicable in the treatment of chronic (non-malignant) diseases of the stomach. Gastro-faradization appears especially useful in cases of dilatation of the stomach and enteroptosis, in atonic conditions of the cardia (ructus) and pylorus (presence of larger amounts of bile in the stomach), and in chronic gastric catarrh (gastritis chronica glandularis). Gastro-galvanization is almost a sovereign means for combating severe and obstinate gastralgia, whether of nervous origin or caused by cicatrized ulcer of the stomach. Gastro-galvanization exerts a favorable influence on several affections of the heart complicated with gastralgia."

W. H. Thomson⁸¹⁴_{Jan.} reports 78 cases of gastric disorder in

which resorcin was administered. In 21 cases of gastric disturbance consecutive to nervous disorder no relief was given. In 6 doubtful cases 4 proved to be dependent on gall-stones, 1 was associated with mental depression, and 1 patient finally developed ataxic symptoms. Of 51 successful cases, 17 presented symptoms of gastric ulceration, and 34 were instances of chronic gastritis without definite symptoms of ulceration. Pick³⁵⁷ _{Sept. 24} recommends large doses of bismuth subnitrate in chronic catarrh of the stomach. In the morning the patient takes about a teaspoonful of Carlsbad salts in a $\frac{1}{4}$ litre ($\frac{1}{2}$ pint) of water. One-half hour afterward a heaped teaspoonful of bismuth subnitrate is given, preferably in two wafers. The patient is instructed to breakfast a half-hour after taking the medicine, the stomach, meanwhile, being lightly massaged.

Fleiner⁴¹ _{May 6} thinks that the most frequent cause of pain in the stomach is spasm of the gastric orifices and distension of the stomach-walls. In cases where the pain is associated with an irritating quality of the gastric juice, bismuth subnitrate is most useful. The technique of its introduction is as follows: The stomach is first thoroughly washed out; then 20 grammes (5 drachms) of bismuth subnitrate suspended in 200 grammes ($6\frac{1}{2}$ ounces) of water are poured into the stomach. In three minutes the water returns clear, proving that the bismuth has settled. In the beginning the procedure is repeated daily; later, less often. No unpleasant after-effect was observed in any case. On the second or third day the bismuth is removed during lavage. The effect of the introduction of bismuth is sedative; supersecretion and superacidity are diminished, pyloric spasm abrogated; starches are better borne. Probably the bismuth develops some antizymotic power. In cancer and ulcer the bismuth medication alleviates pain. It is only contra-indicated in conditions of great impairment of digestion.

Penzoldt¹¹⁶ _{May 1; June 3} insists that the disappointment experienced by some in the use of orexin to restore appetite was due to poor selection of cases, or to the use of the hydrochlorate instead of basic orexin in powder. Giving 5 to 8 grains (0.3 to 0.5 gramme) daily at 10 A.M. for periods of one to six days, it restored impaired appetite in 27 out of 37 selected cases of anorexia, 14 being early cases of pulmonary tuberculosis. The drug was given in cachets, but it

may be taken dry, followed by a draught of water. Should it fail after a trial of five to ten days, it should be suspended for a week, when a second course may be successful.

Sittmann ³¹_{July 18} recommends papain in diseases of the stomach. It is given in doses of 0.3 to 0.5 grammes ($4\frac{1}{2}$ to $7\frac{1}{2}$ grains) after meals. Brissaud ³⁵⁷_{Sept. 24} recommends sodium chloride in daily doses of from 8 to 16 grammes (2 to $4\frac{1}{4}$ drachms) in cancer of the stomach. The vomiting of blood ceases, the appetite returns, and the cachexia disappears under its administration.

Sir B. W. Richardson ³⁸_{V.10, No. 88} has prescribed for many years the following formula for fermentative dyspepsia, and is satisfied as to its value in stomachic cases where there is constantly repeating acid eructation, distension, and what is called "heartburn": Rx Ol. creasoti puri, ℥ xij (0.78 grammes); sp. tenuoris, fʒii (77.5 grammes); ammonii benzoatis, 5ij (8.00 grammes); glycerini puri, fʒvj (23 grammes); infus. caryophilli, ad fʒvj (186 grammes). Fiat mistura. A twelfth part, or half a fluidounce (16 grammes) to be taken in 4 ounces of water, as directed. He usually directs the dose to be taken between meals two or three times a day. If the acidity is considerable, a little alkali—potassa is best—can be added with each dose, or as occasion may require.

Mays, ¹⁰¹³_{V.4} in discussing the tonic treatment of indigestion, calls attention to the interesting experiments of Pohl, who found that the aromatic bitters increased the number of white blood-cells. One of the best bitters is nux vomica.

Robertson ⁶_{July 8} and Ledingham ⁶_{June 24} recommend chlorobrom in seasickness.

A new stomach-tube has been devised by Demarest. ⁵⁹_{Mar. 11} It consists of "a piece of rubber tubing attached to an ordinary fountain syringe (in the course of which there is inserted a hard-rubber cut-off), terminating at its end in a hard-rubber cylinder, which receives a double-jointed hard-rubber attachment, each portion being so arranged as to form a sliding-joint. The removal of the first portion secures immediate siphonage."

DISEASES OF THE PANCREAS.

Pancreatic Diabetes.—Lépine ²¹_{Nov. 6, 192} has definitely ascertained that the pancreas will destroy in a given time, at a temperature of 39° C. (102.2° F.), a greater amount of sugar than will be destroyed

by an equal weight of blood under the same conditions. He has also found that the salivary glands and the mucous membrane of the superior portion of the small intestine (he has not examined the inferior portion) have likewise a greater glycolytic power than the blood.

Thiroloix,⁷ after repeating Claude Bernard's experiments in the production of glycosuria in dogs by puncture of the bulb, undertook to separate the pancreatic and hepatic influences by extirpation of the pancreas according to the method he has previously described, leaving intact the nervo-vascular pedicle. The temporary glycosuria following the extirpation having disappeared, glycosuria could again be produced by puncture of the bulb. In one case the pedicle was left intact, and the animal recovered. In two cases it was severed, and the animals died. In all three cases the hepatic glycosuria produced by irritation of the bulb was temporary. Thiroloix believes that these observations confirm Lancreaux's doctrine, that all cases of diabetes with emaciation in man are either pancreatic, by direct lesion of pancreatic structure, or neuro-pancreatic, the latter being more frequent.

Brunet¹⁸⁸ _{Oct. 30} reported a case of calculi of the pancreas, with atrophy of the glandular structure and occlusion of the duct of Wirsung, in a man of 57 years, who had complained of great fatigue and muscular weakness, and in whom the ordinary symptoms of diabetes mellitus supervened. The necropsy showed, in addition, tuberculous lesions of the lung.

Freyhan⁴ _{Feb. 6; Feb. 25} ² records two cases of diabetes in which death occurred from phthisis, and in which disease of the pancreas was found at necropsy. In the first case the pancreas was atrophic, its substance being converted into fatty tissue. The duct was dilated and had a varicose appearance, the walls being much thickened. Large and small calculi, consisting of calcium carbonate and some sand, were found in it. In the second case the place of the pancreas was taken up by a body almost entirely composed of fat and connective tissue. In the tail was a calculus about the size of a plum-stone, made up of a nucleus of calcium carbonate, surrounded by cholesterin. The duct beyond was dilated and filled with sand, the remaining part having atrophied. In both cases all glandular substance was destroyed.

Picot¹⁸⁸ _{June 14} reports a case of diabetes in which post-mortem

pancreatic lithiasis was discovered. The stones were composed entirely of calcium phosphate. The gland was markedly cirrhotic, and the canal of Wirsung was not patent.

Hæmorrhage.—Kütschau⁸⁵⁴ relates the case of a patient, aged 24, who was suddenly seized with pain in the cardiac region, which passed off gradually; but twenty-four hours later the patient experienced a sudden feeling of fullness in the region of the stomach, collapse supervened, and death followed. At the autopsy the pancreas was found to be the seat of an extensive hæmorrhage. The cause was assumed to be fatty degeneration of the pancreas from excessive use of alcohol.

Hawkins⁶ reports a case of pancreatic hæmorrhage and fat-necrosis in a man of 40 years, who had an alcoholic history. Death took place sixty hours after the onset of symptoms. The gland was found much enlarged and hæmorrhagic throughout; there was also blood in the peritoneal cavity, and posteriorly behind the peritoneum. Numerous white specks and nodules were found in the omentum, the subperitoneal and perinephritic fat, and especially in the adipose tissue about the pancreas. These nodules represented the condition known as fat-necrosis.

Pancreatitis.—Lépine²¹¹ believes that the gravity of hæmorrhagic pancreatitis or of pancreatic hæmorrhage bears no relation to the extent of hæmorrhage. Experimentally, death can be caused in dogs by injection of lycopodium in the area of peripheral distribution of the principal pancreatic artery with production of hæmorrhagic infarct; but in a little longer time death can likewise be caused, with anaemia of the pancreas, by slowly introducing a certain quantity of aseptic oil (50 grammes—1½ ounces) into the central extremity of the canal of Wirsung. A few cubic centimetres of oil or 200 cubic centimetres (6½ ounces) of saline solution might be injected into the canal of Wirsung without doing harm. Lépine believes, therefore, that it is arterial ischaemia of the pancreas that brings about death.

Day⁹⁹ reports a case of pancreatitis with hæmorrhage. The patient's symptoms had been chiefly those of gastro-duodenitis, with transient jaundice. He died suddenly in collapse. The pancreas proved the seat of haemorrhages, and presented areas of fat-necrosis. Fitz, in discussing this case, refers to the causation of fat-necrosis. It may be the result of bacterial infection. Welch

and Ernst and Jackson have found micro-organisms in the diseased areas. It may be due to a digestive action of the pancreatic juice which may escape from the gland and attack the tissues.

Rosenthal¹¹⁴_{B.21,p.401; Mar.}⁵ reports a case of chronic interstitial pancreatitis in a girl of 16. The liver was enlarged, and ascites was marked. In addition to the pancreatic cirrhosis, partial thrombosis of the portal vein was found; post-mortem thrombi were also present in the central veins of the hepatic lobules. The writer attributes the disease of the pancreas to inherited syphilis.

Apoplexy of the Pancreas.—Hade⁶_{Jan.14} describes a case of so-called apoplexy of the pancreas, occurring in a female, in consequence, apparently, of prolonged and violent seasickness. The symptoms were analogous to those of peritonitis, there being severe pains on the right side of the abdomen and considerable distension with flatus. The patient died three days after being first seen. The kidneys were found to be granular, and there was a large mass of extravasated blood, originating in the pancreatic artery, spreading over the whole of the pancreas and forcing its way to the two kidneys, which were enveloped in blood-clot.

Injuries.—Jordan Lloyd²_{Nov.12, '92} calls attention to the fact that injury of the pancreas may be a cause of effusion into the lesser peritoneal cavity. He reports two cases. A man, aged 20, had been knocked down by a horse, and on recovering consciousness complained of abdominal pain. The other symptoms were: collapse, frequent vomiting, with an occasional streak of blood in the vomit; temperature of 100° F. (37.8° C.); all subsiding in the course of four or five days. After leaving the hospital, paroxysms of epigastric pain with vomiting recurred about weekly, lasting two or three days at a time. After three or four months an unusually severe attack caused the man to seek re-admission. There was some distension of the abdomen and slight elevation of temperature. Recovery ensued, but about a month later a sudden and severe attack was followed by a swelling in the left hypochondrium. An aspirator-needle was inserted and 29 ounces (900 grammes) of fluid withdrawn. Finally, incision was made, and a cavity found containing a further quantity of dark-brown fluid. Death occurred from exhaustion a few hours later.

"On opening the abdomen, signs of recent peritonitis were found. Situated behind the stomach, and co-extensive with its

posterior surface, was an enormous encysted haematoma, its lower edge reaching further than the stomach and to within one and one-half inches of the transverse umbilical line. It was removable with the stomach, and was filled with 3 or 4 pints ($1\frac{1}{2}$ to 2 litres) of dark blood containing old coagula; thus the comparatively empty and collapsed stomach appeared to rest posteriorly upon a large sac (the lesser peritoneal cavity), which was distended with altered blood. Regarding the structures entering into the composition of the sac-walls, the folds of the lesser omentum were so altered that it was hardly possible to tell what they were, but it appeared as if the haemorrhage might have occurred from some ruptured vein in the gastro-splenic omentum, found its way inward, and gradually become encysted between the peritoneal coat of the stomach posteriorly and the peritoneal covering over the pancreas. No special examination of the pancreas for injury was made."

In connection with this case, Lloyd calls attention to the following points: (1) the injury to the belly, and the symptoms immediately following; (2) the onset of another set of symptoms during the second week, and the rapid development of a large tumor in the umbilical, epigastric, and left hypochondriac region, which presented varying physical signs from time to time, according to the condition of the overlying stomach; (3) the removal of dark fluid contents from this tumor by aspiration; and (4) the discovery, post-mortem, that the tumor was due to a collection of fluid in the cavity of the lesser peritoneum.

The second case was that of a man, aged 27 years, injured in a brawl, his opponent having kept him down by kneeling on his abdomen. His symptoms were vomiting and pain. Examination of the abdomen showed a large protruding swelling, occupying nearly the whole umbilical, the lower part of the epigastric, and the left hypochondriac regions, tense on palpation, fairly well defined, dull on percussion, the dullness not continuous with that of the liver or spleen. A resonant area could be percussed out all around the swelling. There was a dull area in the back, extending from the level of the angle of the left scapula to the lowest ribs, where the breath-sounds and the vocal fremitus were diminished, but not absent. The apex-beat was raised to the fourth left intercostal space, just internal to the nipple. Temperature, 96° F. (35.6° C.);

urine acid, 1025, faint traces of albumen and phosphates. Tunstall aspirated the swelling in the middle line, almost midway between the umbilicus and the ensiform cartilage, and drew off 20 ounces (930 grammes) of dark-brown, turbid fluid. The needle moved up and down synchronously with respiration. The fluid had a specific gravity of 1010, was rich in albumen, and deposited a thick layer, consisting of blood-cells, *débris* of cells, and linear-like crystalline bodies. A second puncture was made at a lower point, and a further small quantity of fluid withdrawn. The tumor re-appeared in a few days, and he was transferred to the surgical wards. From what Lloyd had learned from his previous case he at once diagnosticated the condition as an effusion into the cavity of the lesser peritoneum secondary to injury of the pancreas.

On December 18, 1891, under chloroform, he opened the abdomen by an incision two and one-half inches long in the middle line above the umbilicus. The cavity of the peritoneum was quite healthy. The greater curvature of the stomach lay across the upper end of the opening, with a red and thickened great omentum passing downward from it; the omental vessels were abnormally large and tortuous, and were engorged with blood, the veins being as thick as penholders. A fine needle was pushed through the omentum and fluid found; the omentum was then stitched carefully to the skin, the parietal peritoneum not being included in the sutures. An opening was then made through the omentum, and 84 ounces of a brownish, turbid fluid were caught in receivers. A finger passed into the opening entered a cavity situated behind the stomach, in front of the pancreas, above the colon, below the left lobe of the liver, limited at the right but passing deeply backward to the left, beyond reach of the finger. A double rubber drain-tube was inserted, and the parts dressed with dry boracic dressings.

The patient made an uninterrupted recovery, the temperature being subnormal throughout. The fluid examined immediately after its removal was turbid, brownish pink in color, viscid; specific gravity, 1013; slightly alkaline; tasteless and odorless. On standing, a one-third pink flocculent precipitate fell, and the upper layer remained turbid and of a yellow color. Professor Allen, of the Mason College, examined the fluid, and reported as follows: "A

turbid fluid of reddish-gray color; specific gravity, 1012; reaction slightly alkaline. Under microscope shows great quantity of blood-corpuscles, many small crystals (probably phosphates, as being the most likely to exist in an alkaline fluid), a few globules of fat, and a few fine filaments resembling fibrin, but possibly adventitious material from the vessels used.

“*Proteids.*—Fluid gives coagulum on boiling, which is greatly augmented on acidifying the boiling fluid. Thus there is present a small amount of albumen or globulin, and a much larger quantity of alkali albuminate. The coagulum, after standing twelve hours, amounts to two-thirds, representing 1 per cent. of dry proteids. The estimate is confirmed by Esbach’s method. The filtrate, after coagulation, gives a faint rose-color, with NaHO and CuSO₄, indicating a trace of albumose or peptone, or both, but the quantity is too small to separate them. The albumose is insufficient to give a perceptible precipitate with ferric acetate.

“*Sugar.*—Another portion of the same filtrate gives a slight yellow color when heated with NaHO; therefore sugar is probably present in minute quantity. (Other tests are not applicable, owing to presence of trace of proteids.)

“*Digestive Properties.*—When mixed with an equal quantity of starch-paste, it converts the starch rapidly into sugar, in five or ten minutes. Fibrin left in the fluid for twenty-four hours, at body-temperature, is not perceptibly dissolved, and the fluid scarcely shows any increase of albumose or peptone after the process; therefore trypsin is absent, or nearly so. As might be expected of a fluid containing so much alkali-albuminate, it forms an emulsion with olive-oil on shaking; but its emulsive power is very weak, being only about one-fifth that of a 1-per-cent. solution of sodium carbonate.

“*Remarks.*—The hypothesis that the fluid was derived from a cavity in connection with the pancreas is favored by the presence of (1) abundant amylolytic ferment, (2) a peculiar preponderance of alkali-albuminate, and (3) traces of albumose or peptone. It is not, however, normal pancreatic juice, as shown by the absence of trypsin. If trypsin had been present, the alkali-albuminate would not have remained as such, but would have been mostly converted into albumose and peptone while the fluid was still in the body. It must be remembered, too, that amylolytic ferments

occur in various fluids besides the digestive juices. The emulsive action is not a special feature of pancreatic juice, but belongs to any fluid containing a fair amount of alkali-albuminate."

Tumors.—An exhaustive study of the literature of primary cancer of the pancreas is published by Mirallié.^{100 Aug. 19} The disease is twice as frequent in men as in women, usually appears between the ages of 30 and 50, and is nearly always located in the head of the gland. Icterus is usually the first sign, and is progressive; then pain, which sometimes precedes the icterus. The pain is generally continuous, at times cardialgic in type. The size of the liver varies with the stages of the disease; in the beginning it is enlarged on account of retention of bile. The gall-bladder is distended from pressure on the common duct; in obstruction of the duct by gall-stones the organ is not dilated. The tumor may press upon the portal vein, and thus give rise to ascites; or on the aorta, and simulate aneurism. Only in about a fifth of the cases can a tumor be palpated.

Constipation is the rule; the stools are usually fatty. Vomiting of fatty matter also occurs. The urine may contain fat, is often albuminous, and in a certain percentage of cases contains sugar. The glycosuria is associated usually with the *diabète maigre* of the French. In the terminal stage of the disease the glycosuria disappears. The duration of cancer of the pancreas is from four to six months. As to diagnosis, no single sign or symptom is pathognomonic; epigastric pains, icterus, dilatation of the gall-bladder, cachexia, and steorrhœa should suggest disease of the pancreas. Glycosuria is, in such cases, an important contributory sign. The treatment is palliative; the administration of pigs' pancreas and, perhaps, cholecystenterostomy are temporarily useful.

Choupin and Molle^{228 June 15} report a case of primary glandular cancer of the pancreas, in which the symptoms at no time suggested disease of that organ. The patient was well nourished, and had no marked cachexia. During the last few days before death the temperature was strikingly subnormal, sinking to 32.6° on the day of exitus. This fall of temperature the writers consider an important symptom in doubtful cases. A case of cancer of the pancreas, resembling acute suppurative disease, is reported, by Smith.^{6 Aug. 6} Nothing was found post-mortem to explain the fever.

Durante⁷ reports an interesting example of alveolar cancer of the biliary passages secondary to a microscopic cancer of the head of the pancreas. Without histological examination the pancreatic disease would not have been discovered. During life the diagnosis was led astray in a peculiar manner. The patient was a woman aged 55 years. The principal symptoms were anorexia and icterus. A hard, irregular bossellated tumor, giving a false renal *ballottement*, was found in the right hypochondrium. The liver was not enlarged. At the necropsy the apparent renal or suprarenal tumor proved to be an enlarged and cancerous gall-bladder containing numerous calculi.

Rue²⁰³ reported a case which he believes to be confirmatory of the value of Sahli's salol test in the diagnosis of cancer of the pancreas. The patient, aged 70 years, had presented an icterus, which, after a time, disappeared, but later recurred, and remained permanent. There was no pain, and no history of hepatic colic. A tumor was demonstrated, occupying the region of the gall-bladder, and of the shape of that structure. The liver extended three fingers' breadth below the ribs, but was not nodulated or painful. There was no ascites; 15 grains (1 gramme) of salol, in two doses, were given on each of two successive days. The urine of the first day was unfortunately lost, and the patient died on the second day. Post-mortem there were drawn from the bladder 400 grammes (13 ounces) of urine, which, on chemical analysis, gave no trace of either salicylic acid or phenol. There was found a cancer of the head of the pancreas compressing the common duct. The biliary vessels were all much dilated, and the gall-bladder distended, forming a tumor.

Paviot²⁰⁴ reports a case of glandular cancer of the pancreas in a woman of 72. The gall-bladder was not dilated.

A case unusually instructive, from a diagnostic stand-point, is reported by Elsner, of Syracuse, N. Y.¹. The patient, a woman of 42 years, had complained for several months of distress after eating, with pains, independent of food-taking, that radiated through the upper half of the abdomen; emaciation, muscular feebleness, and anaemia were progressive; there was chronic constipation, flatulence about two hours after meals, and occasional vomiting, usually of a light-colored, sour-tasting, but not foul-smelling liquid. At times the vomited fluid was darker, almost

brown in color, but it never contained blood. Alteration in that organ and physical exploration with inflation of stomach detected no abnormality, and analysis of the gastric contents showed HCl, pepsin, and rennet to be present in normal quantity, digestion to be well performed, and no organic acid present five hours after a Leube-Riegel test-meal. The salol test showed normal motor and absorptive power. The urine was normal. Later a nodule was felt near the pylorus, which, after inflation, was found to be posterior to the stomach. The diagnosis of pancreatic cancer was confirmed by the appearance of glycosuria a few weeks before profuse diarrhoea and collapse resulted in death. Other nodules developed, and the autopsy showed a cancerous mass of the head of the pancreas with retroperitoneal and omental nodules, the stomach being entirely free from disease. Fat was not at any time found in the stools.

Flexner⁷⁶⁴ Oct., Nov., '92 reports a case of spindle-cell sarcoma of the peripancreatic lymphatic glands, with miliary sarcomatosis of the peritoneum, metastases in the liver, lungs, and pleura. The patient was a colored woman between 45 and 50 years of age. In addition to the sarcomata, there was a large uterine, myomatous mass.

Tuberculosis.—In a study of 128 cases of tuberculosis, Kudrewetski⁴⁰⁵ B.13, H.2, 3 found the pancreas tuberculous in 13, or in 9.37 per cent. The pancreatic disease seems to be always secondary, either by extension from neighboring organs or haematogenous in miliary tuberculosis. Sex plays no rôle; age, on the contrary, is an important factor, 44.44 per cent. of the bodies of children examined presenting tuberculosis of the pancreas.

Neve,²¹⁴³ surgeon to the Kashmir Mission Hospital, publishes an interesting summary of the morbid anatomy of the pancreas. In the examination of more than one hundred specimens of pancreatic disease he has never found simple induration. Five cases of induration without cirrhosis were associated with parenchymatous inflammation or degeneration. In 29 cases out of 87, examined microscopically, the pancreas of phthisical subjects was found to be in a state of fatty degeneration.

Cysts.—F. A. Meacham reports, from the service of S. H. Pinkerton, of Salt Lake City ("A Synopsis of Clinical Surgery during the Service of S. H. Pinkerton at the Holy Cross Hospital,

Salt Lake City, 1893," p. 49), a case of successful operation for cyst of the pancreas in a miner aged 45 years. Councilman, of Johns Hopkins University, determined that the fluid sent to him, and which had been obtained by puncture from a smooth, round, and non-pulsating tumor occupying the whole epigastric and left hypochondriac regions, was pancreatic. It is noteworthy that this fluid had no saccharifying action on starch. The patient's urine contained neither albumen nor sugar, but phosphates were excessive. The tumor was exposed, and about 3 quarts (litres) of fluid aspirated. It was then stitched to the abdominal wall, incised, and two more quarts of fluid drawn off. The cyst was not adherent to omentum or peritoneum. A rubber drainage-tube was inserted, through which fluid was discharged for several weeks. A case of cyst of the tail of the pancreas simulating ovarian cyst is reported by Hersche.⁸ No. 51 A celiotomy had been performed, in the belief that the cyst was ovarian. The fluid was withdrawn, and the patient recovered.

DISEASES OF THE LIVER.

General Considerations.—Bauer²²² Aug. has repeated some of the experiments made by European investigators on the effects of ligating the common bile-duct. A few of the animals operated upon lived for a considerable length of time, and Bauer was able to note, at least in one experiment, that contraction and atrophy succeeded the stage of enlargement. In all cases increase of the connective tissue and proliferation of the ducts were observable.

In a lecture on hepatic insufficiency, Huchard¹⁵¹ Sept. dwells on the importance of recognizing this condition, which consists in a suppression of the functions of the liver-cells. The symptoms usually are: emaciation, somnolence, vomiting, jaundice, ascites,—all the symptoms, in fact, that accompany grave hepatic disease. The urine is diminished and the quantity of urea reduced far below normal. The glycogenetic function of the liver is depressed. To test this function, Huchard introduces 150 to 200 grammes ($4\frac{3}{4}$ to 6½ ounces) of sugar into the stomach. Normally, this is destroyed in a few hours, but in hepatic insufficiency this does not occur readily, and traces of sugar are found in the urine in from two to four hours afterward. Many cases die "by the liver"; hepatic insufficiency is a grave complication of some cases of typhoid fever. The treatment consists (1) in favoring the glycogenetic

function of the liver; (2) in promoting renal activity; (3) in stopping all sources of poisoning. The first two are accomplished by a milk diet; the third by diet and by avoidance of poison; potash salts should not be given, but the sodium salts should be used; alkaloids must also be avoided.

Klippel⁷⁵_{Nov. 15, 1912} maintains that hepatic disturbances, like renal and intestinal, can give rise to mental derangement. The disturbed function of the liver manifests itself in an increased uric-acid excretion, diminution of urea, defective formation of glycogen, peptonuria, and urobilinuria. He relates a case in which this "hepatic insanity" developed acutely in a man aged 62.

By the inoculation of an organism termed by him "bacillus septicus putridus," Roger¹⁴_{July 5} has produced a varied group of lesions of the liver: In acute cases, dilatation of the capillaries and thromboses; in the chronic, nodular areas of degeneration or a true cirrhosis. The results are the same whether the organism is inoculated into the peripheral veins or under the skin. The writer thinks it probable that cirrhosis in man may have some infectious malady as its origin.

Hanot⁵⁵_{May 27} calls attention to certain white spots visible on the surface of the liver in infectious diseases, proposing the name of "white spots of the infectious liver" for them. They are commonly situated on the convexity of the organ; are round, if small; oval or quadrate, if large. They vary from the size of a lentil to that of a dollar. Histological examination demonstrates dilatation of the capillaries, the presence of a leucocytic infiltration in the tissues of the spot, and micro-organisms, these varying according to the case.

Icterus.—Bezançon⁷_{No. 6} reports a case of chronic obstructive jaundice due to a narrowing of the ductus communis choledochus by a cicatricial band situated just at the junction of the cystic and hepatic ducts. The gall-bladder was atrophied. The presence of the fibrous band was ascribed to an ulceration that had probably been caused at one time by a stone which had passed out. The liver and spleen contained pure cultures of the bacillus coli communis.

Rendu¹⁴_{May 28; July 8} reports two cases of infectious jaundice,—one occurring in a woman of 67 years, who appeared to be suffering with apical pneumonia; and the other in a man, 32 years of age,

the subject of facial erysipelas with cerebral complications. In neither was there obstruction of the bile-duets. Rendu believes that toxic cases of this nature may become malignant through renal complications which, in turn, react upon the liver. Happener²² _{July 22} described "a sort of infectious icterus resembling typhoid in its clinical appearance." The phenomena are ushered in with pain in the head and limbs, the temperature gradually rising till it reaches 39° or 39.5° C. (102.2° to 103° F.), which height continues five to eight days. On the fourth or fifth day icterus appears, the spleen is enlarged, and the margin of the liver is prominent and painful. The tongue is coated. The urine contains albumen from the beginning, but becomes dark on the fourth day, although the faeces are normal and sometimes colorless. The duration of the disease is between two and three weeks. It usually terminates in recovery. Two fatal cases, however, are on record. The necropsies revealed great reddening and swelling of the solitary follicles. Another case of fatal ending lasted four weeks; but the fever continued only five days, after which followed somnolence, stupor, and death. Urticaria and blood extravasation appeared under the skin. The necropsy showed the usual swelling of solitary follicles, with some of them ulcerated and broken down; infarcts were present in the kidneys, and the liver was greatly enlarged, with an intense yellow color, and the gall-fluid inspissated.

Bradshaw¹⁸⁷ _{July} reports a case of jaundice associated with enlarged liver and symptoms of the typhoid state. No positive conclusion was reached ante-mortem, nor did the lesions found post-mortem admit of one. The liver was enlarged, the epithelium necrosed. The writer calls it a case of acute hepatitis. Liebermeister⁶⁰ _{Apt 29} proposes the term akathektic (from akathectos—unretained) icterus for that form of jaundice caused by pathological changes in the liver-cells, through which they become unable to retain their secretion. Akathektic icterus may be caused by poisons, such as phosphorus, chloroform, arsenic, mineral acids, snake-venom; by the infectious diseases,—for instance, yellow fever and Weil's disease,—and, in all probability, the jaundice of pneumonia, malaria, typhoid, etc., is of this type, as is likewise the icterus due to emotion. While the majority of cases of icterus not due to obstruction are, therefore, probably akathektic,

yet in the present state of knowledge an haematoxenous origin for some forms of jaundice cannot be denied. When haemoglobinuria exists, the accompanying icterus is almost certainly haematoxenous.

Talamon³¹ _{Aug. 23} reports a case of jaundice due to emotion. It occurred in a woman of 24 years, apparently not neurotic, and manifested itself five or six hours after the nervous shock. As to the pathology of emotional icterus, Talamon believes that Liebermeister's view of an akathetic icterus explains the condition to a great extent, but that dilatation of the hepatic capillaries and active contractions of the bile-ducts are additional factors.

A nervous origin of many cases of jaundice is maintained by Rockwell.¹ _{Dec. 10, 1922} The diagnosis is to be made by the history of the case; the jaundice is usually of sudden onset.

In a case of catarrhal jaundice treated by faradization of the gall-bladder, Renzi⁵⁹⁶ _{Apr.} found that every application of the current was followed by a transient rise of temperature. The explanation given is that the contraction provoked by the electrical stimulation forced some infective principle into the circulation.

Wechsler⁵⁸⁶ _{No. 19} recommends massage in the treatment of catarrhal jaundice. The method consists in rhythmical compression of the hepatic region for ten minutes, thrice daily.

Acute Yellow Atrophy.—Ranglaret and Mahen⁵⁵ _{Aug. 12} made cultures from the liver, spleen, and lungs of a case of acute yellow atrophy of the liver. In addition to the bacterium terms staphylococcus pyogenes aureus and pneumonia bacillus, they found, in the three organs examined, a new microbe, described as an aëro-anaërobic streptobacillus, 1 μ to 2 μ long and 0.5 μ in breadth, sometimes slightly incurved, sometimes with rounded ends. It stains with methyl-violet, gentian-violet, by the methods of Lubimoff, Gramm, and Kuhne. Inoculations with pure cultures caused the death of guinea-pigs, with atrophy of the hepatic cells. The authors refrain from positive conclusions based upon a single case. Bacteriological studies of malignant jaundice (acute yellow atrophy) have also been made by Vincent,¹⁴ _{May 10} who concludes that the affection may be produced by a variety of micro-organisms, among which the bacillus coli communis is most frequent. In one case the staphylococcus pyogenes albus was found.

Hanot¹⁴ _{Apr.} points out the fact that grave infectious icterus,

although usually attended by hyperpyrexia, may present a subnormal temperature. Three cases are reported; in all of them the bacillus coli communis was found, either in the organs and the bile or in the dejecta. The conclusion reached is that the disease is due to this bacillus. [If Hanot refers to acute yellow atrophy, subnormal temperature at some period of the disease is recognized, at least among English-writing physicians, as among the diagnostic features.—Ed.]

Williams¹⁰⁵⁵_{Aug. 1} reports a case of acute yellow atrophy in a Hindoo. Chemical examination failed to reveal any mineral poison, and the case is probably one due to infection. Allen²⁸⁵_{June 14} exhibited a liver showing acute yellow atrophy. The duration of the patient's illness was six days. On admission to the Melbourne Hospital, twenty-four hours before death, the temperature was 95.2° F. (35° C.).

Cirrhosis.—Hanot¹¹_{Sept. 27} believes that hypertrophic cirrhosis of the liver with icterus (the so-called Hanot's disease, or biliary diabetes) is infectious in its origin. Pilliet⁷_{Sept. 17} reports a case of infectious cirrhosis of the liver, of unknown origin, in a rabbit that had been inoculated with a fragment of epithelioma of the kidney. Tuberculosis was not found in other organs, and tubercle bacilli could not be found in the hepatic lesions. Psorosperms were likewise absent. The histological appearances were unique, and indicated that the infection had spread from the centre to the periphery.

Freyhan⁴¹_{May 8} believes in the dualistic nature of hepatic cirrhosis. The histological results, however, are sometimes ambiguous, and, alone, are not decisive. The clinical picture, on the other hand, removes all doubt of the existence of hypertrophic cirrhosis. The writer calls attention also to the occasional resemblance between hypertrophic cirrhosis and hepatic carcinoma, and lays stress upon the difference in the stools, which are bilious in the former, clay-colored in the latter. He has found, in nearly all his cases of hypertrophic cirrhosis, a history of alcoholism.

A case of congenital hepatic cirrhosis, probably dependent upon syphilis, is reported by Neumann.¹¹_{Mar. 23} Death occurred at 4 months of age. Hansemann⁸_{May 8} also refers to a congenital case.

D'Espine, of Geneva,¹¹_{Aug. 9} observed for three years a case of cirrhosis of the liver in a boy, who was 6 years of age when first

seen. Jaundice or albuminuria never occurred. Ascites necessitated thirty-six punctures in the course of two years. Repeated right-sided pleural effusion preceded death. There was found, at necropsy, extensive fibroid changes and adhesions of peritoneum and viscera, perihepatitis, perisplenitis, enlargement of spleen and liver, the latter exhibiting the evidences of an intense, interstitial, periportal hepatitis. Bouchard, in the discussion, combated the idea that infantile cirrhosis was due to syphilis, and lauded calomel as a therapeutic agent. Pittorino¹⁰²² _{Aug. 1} reports a case of atrophic cirrhosis of the liver in a sea-captain, aged 40 years, in which it was impossible to make a diagnosis during life; the symptoms being febrile in character, while ascites and oedema were absent, and the liver was apparently normal to percussion. Franchomme²²⁰ _{Nov. 18, '92} reports a case of cirrhosis in a man of 22 years. Patient had a profuse haematemesis from rupture of varicose veins of the œsophagus.

Tiraboschi⁵³⁷ _{Jan. 30} has recorded a case presenting some unusual features. Etiologically there was a family predisposition, with which co-operated overeating, especially of spicy food, the influence of cold, and chronic peritonitis. Ascites was extraordinarily great and rapidly reproduced after paracentesis; notwithstanding which the patient survived for thirty-two years. This prolonged duration of the case is explained by the localization of the lesions in the right lobe, permitting compensatory hypertrophy of the left lobe. Progressive chronic polyneuritis was a complication, and is regarded as due to auto-intoxication by intestinal poisons, as a result of impairment of the depurative functions of the liver.

An interesting case of hepatic cirrhosis is reported by Sharkey¹⁰⁷⁷ _{Mar. 22} in a young man of 18 years, with no history save that of heavy beer-drinking for six months. The liver weighed about 10 ounces (300 grammes). No sign of tuberculosis or of syphilis was discovered anywhere in the body. Malaria and other diseases were out of the question also. Another interesting feature of the case was the large amount of urea secreted, contrary to the general rule in cirrhosis of the liver.

Jaccoud¹⁰⁰ _{Feb. 23} lectured upon a case of perivenous cirrhosis of the liver, with great enlargement of the organ, in an alcoholic subject aged 53 years. The liver was hard and without nodulation. It extended four fingers' breadth below the false ribs. The absence of jaundice forbade a diagnosis of biliary cirrhosis. There

were ascites and œdema of the legs, and despite frequent tappings the abdomen rapidly refilled. Jaccoud had previously seen but two cases of chronic interstitial hepatitis of the perivasicular type in which the liver was permanently enlarged.

Ajello and Solaro⁴⁹⁷ have studied the urine in cirrhosis of the liver and reached the following conclusions: 1. The quantity of urea eliminated in twenty-four hours is much diminished, but presents variations from day to day. 2. Milk diet augments the elimination of urea and favors diuresis. 3. With the diminution of the elimination of urea, that of ammonia increases; with a milk diet this is reversed. 4. The chlorides keep pace with the urea. 5. Oxidized urochrome and urobilin are diminished during a milk regimen.

Martini⁵⁰⁵,² _{Feb. 21; July 1} describes three cases of atrophic cirrhosis of the liver, accompanied by marked enlargement of the spleen, in each of which a continuous souffle, increasing during inspiration, could be heard in the sixth intercostal space about the right anterior axillary line. In one case the souffle diminished after the patient had had haematemesis. Two of the cases ended fatally, but nothing was found which would obviously account for the peculiar souffle heard during life. The author is of opinion that this was due to displacement of the ascending vena cava in consequence of the liver being pressed against it by the hypertrophied spleen and the ascitic fluid. The displaced cava would, under such circumstances, tend to become squeezed against the edge of the phrenic orifice of the diaphragm, below which it was, in fact, observed to have become widened. Under such circumstances the occurrence of a murmur might probably be due to the formation of a *reine fluide* at the site of the obstruction.

Sior⁴,² _{Dec. 20, 1921; Jan. 24} claims to have cured by calomel a case of hypertrophic cirrhosis of the liver, with jaundice of nine months' duration, in a man aged 30 years, 0.05 grammes ($\frac{7}{8}$ grain) being given six times daily for three days, and repeated after an interval of three days. At the time of the patient's discharge, after three months of this treatment, the jaundice had disappeared; there was no bile-pigment in the urine; the stools were pale yellow in color. The liver, which had extended three finger's breadth below the costal margin of the nipple-line, extended only one finger's breadth below the ribs, and its upper limit of dullness was the

sixth rib. The enlarged spleen had been much reduced in size; nutrition and strength were good. The author defends his diagnosis.

Ferreira⁶⁷ reports four cases of cirrhosis of the liver of alcoholic origin and one due to paludism, in which cures were obtained by the administration of the iodides and mercury, the latter in the form of blue pill, together with diuretic medicaments. Sasaki⁴_{No. 47, 192; Mar.}¹⁵¹ states that Japanese physicians obtain excellent results from the use of potassium bitartrate (8 to 40 grammes—2 to 10 drachms—per diem) combined with tonics, in ascites due to cirrhosis of the liver.

Jonathan Hutchinson⁸⁰⁶_{Oct., '92} saw a man, 29 years of age, whom he was said to have "cured of a drunkard's liver nineteen years ago." The prescription then given had been used at intervals ever since. It was found to consist of 5 drops of tincture of *nux vomica* and $\frac{1}{2}$ drachm (2 grammes) of *taraxacum* juice, to be taken three times a day. As the boy got older, he somewhat increased the dose. Hutchinson calls attention to the similarity between the action of *taraxacum* and that of mercury upon the liver. The drug must be given in sufficiently large doses.

Abscess.—Zanearol⁹¹_{Aug., '10} has attempted, experimentally, to solve the question of the causation of hepatic abscess. His experiments consisted in injecting into the rectum of cats dysenteric stools containing amœbæ, pus from hepatic abscesses, and pure cultures of streptococcus. The following are his conclusions: 1. Abscess of the liver is a micro-organismal disease. 2. The principal factor is a streptococcus. 3. Dysentery is a disease of the same character,—*i.e.*, produced by a streptococcus. The amœbæ play no rôle in the pathogenesis of this affection. 4. The point of entrance of micro-organisms found in the liver is chiefly the intestinal tract, whence they pass to the liver either with the portal blood or the general circulation.

Loison and Arnaud⁹²_{Nov., '92} enunciate the following conclusions: 1. Abscesses of the liver are micro-organismal in origin. 2. They may be monomicrobic or polymicrobic; they do not present, therefore, any specific bacteriological character. 3. They do not present a specific clinical picture; they develop in the course of diverse infections of the intestinal canal. 4. They are most often pyocholic in origin; rarely pyæmic. 5. As soon as recognized, they should

be opened and drained, without waiting for pleural or peritoneal adhesions.

Clarke¹⁵ _{Oct.} reports several cases of multiple abscess of the liver. In the pus of one, the staphylococcus pyogenes albus; in another, the staphylococcus pyogenes aureus and a streptococcus; in a third, a staphylococcus and the bacterium coli commune were found. MacFadyen² _{July 15} found, in a tropical hepatic abscess not dependent upon dysentery, pure cultures of staphylococcus pyogenes aureus. Amœbae were not present. In discussing the etiological relations of hepatic abscess in the tropics, Younge²² _{Sept.} comes to the conclusion that "hepatic exhaustion" is the most important factor. This exhaustion is induced by the blood deterioration which occurs as the result of prolonged exposure to great atmospheric heat, the liver being the organ through which effete blood-corpuscles are removed. The smaller amount of oxygen in the air in the tropics and a lowered rate of respiration diminish the exhalation of carbon dioxide from the lungs by 25 per cent. The liver is hence called upon to excrete a large amount of carbohydrates. These two factors, the increased excretion of carbohydrates and the disposition of large quantities of useless corpuscles, constitute the strain which causes hepatic exhaustion.

Arnaud⁴⁶ _{Apr. 15} reports a case of suppurative perihepatitis and abscess of the liver without any demonstrable connection between the two lesions. The pus of the peritoneal abscess was sterile, while from that of the liver proper pure cultures of the bacterium coli commune were obtained. A case of hepatic abscess successfully treated by operation is reported by Langworthy.¹⁰² _{Feb.} In order to reach the abscess it was necessary to resect the eighth rib. Two quarts (litres) of pus were evacuated.

Hydatid Cyst.—To bring clearness into the nomenclature of hydatid cysts, Gardner² _{Mar. 18} suggests that the term "endozyst" be held to mean the parasite, and "ectocyst" the adventitious sac. Lafarelle⁷¹ _{Mar. 19} reports the case of a patient who, two years before, had been successfully tapped for hydatid cyst. At the time of his re-entrance into the hospital the liver was found to be enormously enlarged, extending from the third rib to below the umbilicus. Several punctures were made without result, and the patient died from cachexia. The necropsy demonstrated a huge suppurative hydatid cyst on the convexity of the liver, which had displaced

the organ downward. Debove, ¹⁴ Dec. 11, '92 on tapping the abdomen of a girl of 17, supposed to be suffering from tuberculous peritonitis, obtained a bile-stained fluid containing echinococcus hooklets. An hydatid cyst had probably perforated a bile-duct, with the result that a fistula was established. The non-development of peritonitis may be explained upon the assumption that the bile was aseptic. There had been no jaundice, nor were biliary pigments found in the urine. A similar case is described by Laveran, ¹⁴ Dec. 18, '92 in which the post-mortem demonstrated that the fluid was not contained in the peritoneal cavity itself, but in a large abdominal cyst communicating with an intra-hepatic cyst. This illustrates the difficulties surrounding the diagnosis of these cases.

Karmilow ⁸⁵² Nov. 3, '92 reports a case of hydatid disease of the liver, with perforation of one of the cysts into the stomach. Cullen ⁹²⁵ Sept., '92 reports a case of hydatid cysts of the liver, diaphragm, peritoneum, and bladder in a boy of 8 years. Operation was followed by relief of symptoms, but death occurred six days later. Fränkel ⁶⁹ Aug. 19 exhibited the liver from a fatal case of echinococcosis with hepatic abscess in a man aged 33 years. Death occurred shortly after operation. Félixet ¹⁴ Feb. 26 reports the sudden death of a child of 5 years following the injection of glycerin solution of bichloride of mercury into an echinococcus cyst. The autopsy revealed a perforation of the cyst-wall through which the liquid had passed into the peritoneal cavity.

Distoma Lanceolatum.—Aschoff ²⁰ B. 130, H. 3; Mar. ⁴⁵¹ records the discovery of a specimen of distoma in a gall-duct of the liver of a boy, aged 15 years, dead after operation for perforative disease of the appendix vermiciformis with localized purulent peritonitis. There was no local evidence of irritation from the presence of the parasite, other than a very slight degree of nuclear proliferation at one point. Nothing in the history or occupation of the patient is suggestive in relation to the source of infection. For several years he had been employed in the vineyards, and for six months before his fatal illness he was working as a baker's apprentice. The author states that this is the fourth recorded instance of this parasite (Buchholz, Chabert, Lenkart-Kirchner, Aschoff) occurring in man. Two of the other three worms were found in the gall-bladder, and in Chabert's case the parasite was recovered from the stool after the administration of a purgative.

Kurimoto²⁰⁰ _{Jusa 24} reports upon cases of hepatic distoma occurring in the prefecture of Saga, Japan. Jaundice occurred in but 5 out of 100 cases. Heart-murmurs were present in 42 cases. The abdomen was enlarged in 83 cases. The peculiar barrel-like swelling, greatest over the region of the liver, where it projects forward and bilaterally, the walls being very tense, permits a diagnosis of hepatic distoma by simple inspection. The liver itself was enlarged in 93 cases. At first the liver is smooth, but later it becomes nodulated, and the stage of the disease can thus be determined by palpation. In 5 cases atrophy was the terminal stage. Tenderness in the hepatic region is slight, and in but 41 cases was there any complaint of pain.

According to Dentu,¹⁴ _{Feb. 12} tumors of the biliary passages, or located in the neighborhood of the liver, may give rise to *ballottement* simulating that obtainable in certain kidney affections.

Zuber⁷ _{No. 9} and Pic²¹¹ _{Mar. 26} report each a case of primary massive cancer of the liver. In one there were no secondary foci, in the other (Pic's) cancerous nodules were found in the spleen, the kidneys, and the lungs.

Collinet and Chapt⁷ _{Dec. 72} report a case of primary cancer of the liver, with icterus and ascites. Thrombi were present in the portal and hepatic veins which contained collections of cancer-cells. Portc²¹¹ _{Aug. 13} exhibited a specimen of carcinoma of the bile-ducts, from a woman aged 58 years. There was generalized carcinoma of the lung, haemorrhagic pleurisy, and haematoma of the right rectus muscle. Létienne⁷ _{No. 9} records the formation of a subdiaphragmatic abscess in the course of an hepatic cancer. The abscess subsequently ruptured into one of the left bronchi.

Williams² _{Aug. 25} calls attention to the frequency with which cancer and biliary lithiasis are associated. Of 44 cases of mammary cancer in females, gall-stones were found in 16 per cent., a ratio twice as high as that stated to hold for women dead of causes other than cancer.

Lendrop³⁷³ _{p. 217; July 673} communicates an observation of a case of primary sarcoma of the liver in a child 4 months old. There was no icterus, but the abdomen was enormously distended, measuring forty-six centimetres at the arcus costarum and forty-nine and a half centimetres at the umbilicus, while the distance from the processus ensiformis to the symphysis pubis was twenty-two centi-

metres. At the necropsy the liver was found to contain numerous disseminated tumors of a light red-brown color, the tissues being loose and showing softening, but no caseous change. The growth consisted of small round-cells, which seemed to originate from the endothelium of the interacinous blood-vessels and penetrate into the veins, where they compressed the liver-cells. (Report of Corr. Editor Levison, Copenhagen.)

Coats^{213 Aug.} gives the results of the examination of liver-sections from a case shown to the Glasgow Pathological and Clinical Society in December, 1892. He found adenoma of the liver and miliary tuberculosis, the tubercles, however, being few. Vanni^{596 Apr.} records a case of tubular adenoma of the liver in a man aged 60 years. During life an hepatic souffle was heard over the area of resistance in the abdomen, the point of maximum intensity being situated on a line which, prolonged, would bisect the right clavicle. Death occurred from rupture of the liver.

A case of gumma of the liver with ascites and symptoms resembling malignant disease is reported by Stodart Walker.^{22 Oct. 25, '92} Cure was effected by the use of potassium iodide.

Steele^{6 July 15} believes that cirrhotic deposits in the liver do not affect the neighborhood of the gall-bladder, and, even if they do, do not absolutely obstruct it, whilst in cirrhosis of the pancreas the growth entirely obstructs the common duct. This leads him to the conclusion that, if jaundice has progressed steadily to an extreme degree, no bile is passed by the stool, and the urine is saturated with it, and neither gall-stones nor other cause can be defined, the disease lies in the pancreas. Sometimes the question can be settled *intra vitam* by being able to draw apart the edges of the organs. In these extreme cases of jaundice, in which the patient feels miserable, he advises the establishment of a biliary fistula, in order to give the sufferer some relief. A liver weighing 42 pounds (19 kilogrammes) was removed at an autopsy on a man, aged 58, by Hillegass.^{112 June} No diagnosis had been made; the liver, on microscopical examination, was declared leukæmic.

Pylephlebitis.—Bristowe^{15 Oct. '92} reports three cases of pylephlebitis with autopsy records. The symptoms had been mainly those of pyæmia,—intermittent fever, rigors, sweats, emaciation, slight jaundice. The liver was enlarged and tender, slightly so in one case, more markedly in the other two. The spleen was in-

creased in size in all three cases. Purpuric spots were present in the first case. At the autopsy the liver of each case presented numerous abscesses following the postal channels; the latter were also distended with pus. The intestines were practically healthy in the first case; in the second, the region of the ileo-caecal valve was slightly congested; in the third, there was diffuse purulent peritonitis that had been caused by rupture of one of the hepatic abscesses. The writer advises exploratory puncture of the liver. The first case in which this was resorted to died of haemorrhage into the peritoneal cavity, probably more from the haemorrhagic tendency than from perforation of a vein. G. E. Shoemaker, of Philadelphia,⁹ reports two cases of suppurative pylephlebitis and hepatic abscess secondary to inflammation of the appendix vermiciformis. In one case the appendix was gangrenous; in the other a pin was found in the appendix, post-mortem. Fränkel⁴¹ Nov. 24, 1922 reports a case of pylephlebitis in connection with gall-stones. The liver was not much enlarged downward, but posteriorly dullness extended higher than normal; a condition accounted for post-mortem by the discovery of a subdiaphragmatic abscess.

Gall-Stones.—In the diagnosis, between calculus impacted in the common duct and tumor of the head of the pancreas, dilatation of the gall-bladder is, according to Terrier,⁴¹⁹ No. 15, 1922 in favor of the latter, as the gall-bladder is almost always found atrophied, or cannot be found at all, when a calculus has been impacted for a long time in the common duct, owing to the atrophic and cicatricial changes consequent upon this condition. Obstruction of the cystic duct is commonly attended with dilatation of the gall-bladder. He has seen one case of cirrhosis of the pancreas in which the common duct was obstructed and the gall-bladder dilated. Cases cited by Reclus and by Tillaux prove, however, that this rule is not an invariable one.

Beadles² Sept. 2 does not believe that malignant disease increases the liability to gall-stones. Currier¹⁹ May 20 reports two cases of gall-stones, with perforation of the gall-bladder into the intestine. A fatal case of gall-stone impacted in the intestine is reported by Clark.⁹⁹ Audry²¹¹ Dec. 11, 1922 reports the case of a patient who, during a severe attack of vomiting, ejected from the stomach a gall-stone one and a half centimetres in diameter.

A case of primary rupture of the gall-bladder, probably on

account of stone, is reported by Morton.⁶ An additional cavity had formed under the surrounding adhesions; this finally ruptured into the peritoneal cavity. A stone was found impacted in the common duct, yet there had been no icterus during life, except for a few days two years prior to the patient's death, probably because the stone, though firmly lodged, did not completely obstruct the duct. Terrillon¹⁴ reports a case of obstruction of the small intestine by a gall-stone. The patient recovered after cæliotomy and removal of the obstruction.

Cassael¹⁸⁸ recommends sodium salicylate in biliary lithiasis, both as a cholagogue and as a disinfectant for the bile-passages. According to Strizover,^{111 112} sodium salicylate and salol prevent the formation of gall-stones and hasten their expulsion when formed. He administers 10 grains of salol or of sodium salicylate, three or four times daily, in the intervals between the attacks of colic. During the attack he prefers antipyrin to morphine.

A case of cholecystitis with spontaneous indiguria is reported by Betz.²⁸³ Lane⁶ records a case in which an acute inflammation of the gall-bladder gave rise to a group of symptoms suggesting intestinal obstruction.

Ondo⁴⁶ calls attention to the cardiac complications of hepatic colic. They are always micro-organismal in origin, and usually involve the endocardium. The author, however, reports a case of fatal pericarditis complicating hepatic colic. Geyer¹⁹ reports four cases of hepatic colic successfully treated with glycerin. The remedy is to be given in doses of 1 teaspoonful (4 grammes—1 drachm) to 1 tablespoonful (16 grammes—½ ounce), repeated every fifteen minutes or half-hour, until relief of pain is brought about. In a severe and prolonged case of recurrent hepatic colic recently treated, I found that morphine, or the combination of morphine and atropine, was less successful in controlling pain than the combination of morphine (sulphate), ¼ grain (0.016 gramme); atropine (sulphate), $\frac{1}{150}$ grain (0.00043 gramme), and hyoscine hydrobromate, $\frac{1}{50}$ grain (0.0013 gramme), while the prolonged nausea that had previously been a distressing sequence of the injections did not follow when the hyoscine was used. As, however, hyoscine frequently causes excitation, susceptibility should first be ascertained by the administration of not more than $\frac{1}{50}$ grain in divided doses ($\frac{1}{200}$ grain each) by the mouth.

CHOLERA; DISEASES OF THE INTESTINES AND PERITONEUM.

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CHOLERA.

Etiology.—The experiments of Pettenkofer and Emmerich upon themselves, carried out with a view to determine the specificity of the cholera bacillus, were extensively published. These observers swallowed a sufficient quantity of the micro-organism to give rise to the disease, and the practically negative results obtained tended to invalidate the principle of specificity ascribed to the pathogenic microbe, and to prove that it is not constantly virulent and able invariably to give rise to cholera. Hasterlik ²¹⁴_{Apr.} repeated on himself and three others Pettenkofer's experiment without injury. At first the experimenters took only small amounts of cholera cultures without result, then they took larger amounts, and one of them ate an entire culture of a third generation. In this case in thirty-six hours came pain in the bowels, tenesmus, and diarrhoea without particular characteristics. In one other experiment, in which not a sign of sickness occurred, the cholera bacillus was found in the normal dejections. In the opinion of Guttmann ²²_{Jan 25} and many others, such experiments proved nothing. Every one who has lived through an epidemic of cholera knows that there always are a large number of slight cases. Such mild cases are really cholera, as it can be shown that the dejections contain large quantities of comma bacilli. Whether the disease produced by the experiment was mild or severe was of no moment; if it did not correspond to cholera, it was simply to be understood that the severe type was meant by that expression. Lazarus had shown that the blood-serum of such as had recovered from cholera, if injected into the peritoneal cavity of a guinea-pig, even in a quantity as minute as the ten-thousandth part of a gramme, protected it against an injection of comma bacilli done five hours later,

whilst a control animal died after a similar injection with comma bacilli. If the disease from which Pettenkofer and Emmerich suffered was cholera, their blood-serum would possess this protective property, but the experiment would have to be carried out soon, as the property quickly passed away. The fact that attempts to cultivate comma bacilli from Elbe water did not succeed was of no argumentative importance, for it was known that the other bacteria present in water killed off the comma bacillus. Interesting in this connection are the experiments of Stricker, of Vienna,²² upon the human subject. The results of 8 experiments on 6 individuals were as follow: In 4 cases, 1, 2, 3, and 7, in which the comma bacillus was introduced into the stomach without neutralizing it, no morbid symptoms whatever appeared, nor were any comma bacilli to be found in the stools. In Case 4 there had been a tendency to diarrhoea, and here also the bacillus was given without previous neutralization of the stomach. The following day there was a rise of temperature, eructations, colic, flatus with involuntary evacuation of the bowels, loss of appetite, weakness, and headache. The next day the temperature fell, the colic was less, the eructations less frequent, but the diarrhoea was more frequent, and accompanied by tenesmus. A gradual return to the relative condition of health. During the four following days the motions were fluid. Comma bacilli were found in the stools. In Case 5 the stomach was neutralized before the introduction of the bacilli. The health of the individual and the defecation remained perfectly normal, although comma bacilli were found in the stools twenty-eight hours after their incorporation. Case 6 was that of a person of strong constitution, who for two weeks had had loose motions. Three days afterward, partly solid and partly fluid motions; otherwise well. On the fifth day fluid stools, on the sixth day three brown fluid stools and three mixed with formed material. Comma bacilli were found in a motion passed twenty-eight hours after swallowing the bacilli, and also on the four following days. Although in Case 4 the symptoms following the swallowing of the bacilli were violent and included a strong inclination to vomit, liquid and in part involuntary stools, weakness, and headache, neither Stricker nor his collaborators saw anything that rendered a diagnosis of cholera possible. Stricker repeats the expression of Löffler regarding the swallowing of the comma

bacillus by Pettenkofer and Emmerich, that, had a large number of unselected individuals made a similar experiment, probably some diseases with severe symptoms and a fatal termination would have resulted. He shows that so far, however, this prognostication has not been justified by the result, as six individuals have had eight experiments made on them, and in no case has cholera developed with a fatal result.

Emmerich and Isubio³⁴,_{sos.29,37} sought the cause of the symptoms not in the bacillus itself, but in one of the secondary products known to result from the activity of the comma bacillus. Artificial cultures have been shown to contain a large quantity of nitrites, produced by the action of the micro-organisms on nitrates and carbonate of ammonia, and this circumstance led the authors to investigate the possibility of finding an analogy between the symptoms of cholera and those resulting from nitrite poisoning. The authors first showed, by experiments upon guinea-pigs, rabbits, and dogs, that poisoning by the nitrites caused precisely the same symptoms in guinea-pigs as those induced by cholera. They further demonstrated that the type of disease produced by them in man corresponds exactly with all the symptoms of Asiatic cholera. In both the actual symptoms are vertigo, nausea, diarrhoea; first, slowness of the pulse, then diminution of the same; pronounced vascular engorgement (blue color of the lips, the face, etc.), coldness of the extremities, and diminished quantity of urine. Death occurs in both cases, after severe cramps, during complete consciousness. Poisoning by the nitrites can be proven by examination of the blood by spectral analysis; and it is an interesting fact, and, moreover, an apparent confirmation of the new theory, that the blood of guinea-pigs having died of induced cholera presents exactly the same appearance in the spectrum as that of animals poisoned by the nitrites. Later on the same authors published the results of further investigations,⁵,_{sos.10,12} and showed (1) that, by the addition of alkali in certain proportions to serum-albumen which has been rendered inert by subjection to a temperature of 55° C. (131° F.), the bactericidal power of the latter is restored; and (2) that, by suitable treatment with alkalies (sodium or potassium salts), the bactericidal power of ordinary serum can be very considerably augmented without harm to the organism.

The above views were not destined to a prolonged existence.

Klemperer⁴ rightly objected that the fact *per se* of a chemical poison producing the same clinical symptoms as cholera cannot prove that such poison is the specific cholera poison. Nitrous acid is found in cholera cultures, and, if the virulence of cholera bacilli depend on the acid, it should vary as the amount of nitrous acid present. Klemperer found, by means of Griess's reagent, that bouillon cultures of cholera vibrios (twenty-four hours old) contained 0.0001 per cent. of nitrite, but that when KNO_3 was added to the bouillon 0.1 per cent. of nitrite was obtained. In the peritoneal exudation of guinea-pigs dead of cholera he always found less than 0.005 per cent. of nitrite. On injecting the poison of cholera bacilli free from nitrite into guinea-pigs, the latter succumbed. Again, it was found that the virulence of cholera bacilli may be greatly diminished without diminution of the nitrite production. Furthermore, a chemical substance which claims to be the specific poison of a pathogenic bacterium must possess the power, if properly administered, to immunize the organism against such bacterium. This power nitrite of potassium does not possess. The presence of methæmoglobin in the blood of men or animals dead of cholera cannot prove anything, since this may occur in other infective diseases; so that it is not specific for cholera. Cholera poison is, therefore, not an heterogeneous poison, but a toxin derived from specific organisms, and possessed of the specific property of immunizing the animal body against such organisms.

A new theory of choleraic infection was suggested by Nencki, of St. Petersburg,⁵ based upon the fact that whenever Blachstein, one of the four physicians sent to study the cholera epidemic in Baku and Astrachan, inoculated animals subcutaneously with an infusion of Koch's bacilli they remained unaffected and certainly showed no symptoms of cholera. When, however, instead of the artificially-cultivated bacillus, he injected a portion of the discharges from cholera patients, the animal died with all the usual symptoms of this disease; the cholera bacilli were, of course, present in these dejecta just as they had been in the first case, but as they had not acted in the first instance it followed that the presence of some other species of bacillus might account for the difference in the results obtained. He then found what he describes as two perfectly new micro-organisms, which, when injected alone, were harmless, but where these two were united with the cholera organism

and injected subcutaneously into any animal it very rapidly died of Asiatic cholera; and he concludes, as a result of his experiments, that these three forms, not alone, but acting together, form the etiological factor in Asiatic cholera. The excreta of cholera patients have been so carefully examined from time to time that it appears almost incredible that Blachstein could have discovered two entirely new forms. Micro-organisms other than Koch's comma bacillus have been described as playing a most important part in cholera, whilst the bacillus coli communis has been made to do duty in this rôle more than once. The Naples cholera bacillus and that found at Trieste may have been different from the comma bacillus, and it is quite possible that these two new organisms of Blachstein may be more or less closely related to some of the above. It is, of course, quite conceivable, as has frequently been pointed out, that mixed infection plays a not unimportant part in determining the severity of the disease and the channels by which an animal may become infected, but, until we have much more definite evidence than has at present been vouch-safed, it is impossible to give any very definite opinion on the subject.

For the present it is difficult, without invading the domain of pure conjecture, to reach beyond the conclusions of Rumpf,³¹⁹ ⁵ New York, Sept. who, while accepting the comma bacillus as the etiological factor of Asiatic cholera, does not consider that its presence in the intestine necessarily leads to the development of cholera or a cholera-like disease. The presence of comma bacilli in apparently healthy persons suggests that the bacilli may temporarily or permanently lose their virulence. As, however, in the course of an epidemic the etiological factor in one case leads to an attack of typical cholera, while in another living comma bacilli may pass through the body without disturbance of the general condition, it follows that for the development of the disease certain accessory conditions are essential, which must be looked for rather in the individual disposition than in the circumstances of time and place. The last two may, however, influence the first secondarily. The individual disposition consists essentially in derangement of the digestion, which may result from the ingestion of unsuitable food or from the presence in the intestine of other disease-producing factors. In this connection the occurrence of cholera nostras and intestinal

catarrh contemporarily with Asiatic cholera is quite noteworthy. Notwithstanding the presence of comma bacilli in the intestine, cultivation by plate methods may yield negative results for several days. The growth of comma bacilli obtained from the dejections is a variable one. A retardation followed in one instance as a result of therapeutic measures, especially in connection with the administration of calomel and enemata of soap-water. A similar result was noted in isolated cases after the epidemic in which, with a condition of undisturbed health, comma bacilli were found in the dejecta. The comma bacilli act essentially by the generation of toxins, which influence injuriously the intestinal epithelium and the kidneys, and exercise a paralyzing action upon the circulation and the production of heat. The comma bacilli may remain in the intestinal tract of man in an active condition until the eighteenth day, and perhaps longer (on an average until the sixth day). This fact, together with the resultant chronic condition, may account for a portion of the secondary phenomena, and particularly for the comatose stage.

Hesse, of Dresden, ^{May 12}⁵⁸, believes that cholera is due to the comma bacillus, and that it develops most rapidly in heat. Cholera is ordinarily most frequent in October, its spread being in direct relation to the temperature. During rainy and damp weather it is propagated much more slowly, the temperature being then lower. As to the mode of introduction into the economy, he inclines to the belief that this occurs with the food.

Propagation.—Uffelman ^{June 24}⁴ collected thin layers of finely-powdered garden-earth, fine white sand, sweepings from the street and the floor, mixtures of dust and diarrhoeal discharges, and moistened them with cultures of cholera bacilli. These dried in fourteen to sixteen hours, and were then pulverized. At various intervals cultures from these mixtures were obtained by inoculation and by allowing dust from them to settle on gelatin plates. The results of all the experiments were the same. In sixteen and one-half hours, or just after complete dryness, thirty to forty cholera colonies were found; after twenty-four hours, three cholera colonies; after forty-eight hours, one cholera colony; after seventy-two and ninety-six hours, none were found.

In another experiment Uffelman blew a small portion of the infected material, eight hours after it was dried, on a gelatin plate.

He found six cholera-bacillus colonies; after forty-eight hours no cholera bacilli were developed.

From these experiments Uffelman comes to this conclusion: that most of the cholera bacilli lose their vitality in dried ground-dust or garbage within twenty-four hours, but in some cases they retain their vital activity for a much longer time, and in exceptional cases for three days. These experiments prove that these substances can become intermingled with the air before all the bacteria have lost their vitality.

Rai B. A. Mitra, of Kashmir,²³⁹ Feb. 16 claims that if cholera depended upon water alone Calcutta ought to be free from cholera, whereas it is seldom absent at any time. Admitting that pure water is of great importance, he asserts with emphasis that decaying vegetable and animal matter, bad drainage, and overcrowding are as much responsible for cholera as bad drinking-water, and that the removal of faecal matter and efficient surface and subsoil drainage will reduce the chance of introducing cholera into a town to a minimum. In supplying pure water to the natives, it must be brought to the very door or they will not use it. Without drainage the subsoil water rises, the surface moisture increases, and the exact conditions favorable to cholera and typhoid increase. Mitra expresses the opinion that to improve the sanitary condition of a place the removal and disposal of filth, the prevention of overcrowding, and drainage and roads are by no means of secondary importance; but that when the cholera seeds have germinated in filth, water stands pre-eminently the most convenient, ready, and efficient distributing agent.

Arens³⁴,¹¹² _{Feb. 19, 1911} conducted a series of investigations with the object of detecting the germs when present in so small a number in large quantities of water as to be easily overlooked, or when the ordinary water bacteria are present in too great numbers to allow the few cholera colonies to be observed.

A pancreas bouillon, to which is added 1 per cent. of Whittle's peptone, is used, and to it Arens suggests the addition of 0.05 to 0.08 potassium hydrate, as strong alkalinity favors the development of cholera organisms. The further prosecution of the method is the same as that suggested by Dahmen,⁵⁰ _{Mar. 6, 1910} and this improvement increases its delicacy so much as to make possible the detection of two of the micro-organisms in five cubic centimetres of water.

C. Fraenkel ⁶⁹ Oct. 13, '92 refers to the fact that water is the chief means of conveying the cholera poison. Yet the proof that cholera bacilli are present in it has rarely been established, partly on account of the small amount of water which can be used, and also on account of the number of saprophytic organisms present in the surface layers. Only twice, apparently, have the bacilli been demonstrated,—once by Koch himself and once by Pasquale. The Cholera Conference at St. Petersburg, ² Jan. 21 nevertheless, concluded that in the case of the 1892 epidemic the "pollution of the drinking-water was in almost every case the channel by which the disease was spread." The cholera was shown to have followed the lines of human travel, and to have spread along the course of the rivers, affecting the systems of the Volga, the Don, the Dnieper, etc.

The rôle of flies in the propagation of cholera was made the subject of papers by Amesbury, of Mussoorie, India ²³⁹ Dec. '92; W. Moore, ² June '93 and Savtschenko. ⁵⁸⁶ No. 45 The latter author conducted a series of experiments in this direction, and convinced himself that not only the comma bacillus, but also other bacteria existing in the intestines of choleraic cadavers, are preserved in the intestines of flies at least three days; another sort of bacterium (thought to be the vibrio Metschnikowi) existing in the contents of the bowels of choleraic cadavers does not lose its noxiousness when passing through the intestines of the fly. This vibrio, removed from the intestines of flies three days after infection, killed a guinea-pig and a pigeon after the same lapse of time (twenty-four hours) as a vibrio received directly from the intestines of a choleraic cadaver,—i.e., of the material of which the fly had eaten. If two, three, or even four days after infection of the flies (one experiment) injurious choleraic bacteria are still found in the contents of their intestines, especially if in large numbers, the question arises whether the bacteria are only transferred in the excrements of flies, or whether they can, perhaps, multiply in their intestines. In the last case the flies would not only be simple carriers of the bacteria, but, under favorable conditions of temperature and nourishment, they could become the source from which our food could get new generations of comma bacilli. A rapid development of the epidemic could then be expected in hot, dry weather, and a distinct diminution of cases with the appearance of rain and lower

temperature. The author has not been able to solve this question from observation; but the results of his experiments up to the present time entitle him to advance this more or less probable supposition. (Report of Corr. Editor Drzewiecki, Warsaw.)

According to some experiments carried out by Uffelman, of Rostock,^{July 15} the danger of infection by the postal service is exceedingly great. A letter infected with cholera bacilli put, as in the ordinary way, into a post-bag was found, after twenty-three hours and a half, to be still covered with living bacilli. On post-cards they were found living twenty hours after infection. On coins the bacilli died with remarkable rapidity, whereas on woolen and linen stuffs they enjoyed a particularly long life. He also made experiments with flies, which he found were most successful infection carriers. A fly, which had been infected by being put upon a mass of cholera bacilli, was placed on a piece of beef, which, after a time, was found to contain an enormous number of living bacteria.

Pathology.—Simmons^{34 Nov., '92} has examined three hundred dead bodies from the Hamburg Hospital, and finds that decomposition sets in much later when death occurs in the algid stage. There was observed a fatty degeneration of the pleura and peritoneum, and hyperæmia of the intestinal serous membrane, especially in cases of death in the algid stage. The liver was always found affected, but the bile was much darker when death had taken place in the post-algid period. The kidneys were generally altered, even when the disease had lasted only some hours, showing very often the characteristic lesions of the so-called cholera kidney. Comma bacilli were always found in the intestine, especially a short time after death. The author observes that bacteriological examination alone can aid in making a diagnosis, pathological anatomy furnishing no definite information.

Konrad Alt,^{69 Oct. 20, '92} has isolated a toxic substance from the matter vomited by cholera patients, which, if left exposed for two days, exhales the same odor as the freshly-opened corpse of a cholera patient. This toxalbumen, the chemical reactions of which are not indicated by the author, appears to be secreted by the glands of the gastric mucous membrane. It may be of value in elucidating a case in which the diagnosis is doubtful.

Stiller^{14, 15 Nov. 3, May} calls attention to the condition of the spleen in

cholera. At the outset he points out that it is the most sensitive organ to poisonous products circulating in the blood, and that enlargement is a constant accompaniment of many of the acute fevers, takes place in an early stage, and gives very valuable aid in pointing to a correct diagnosis. Friedreich laid stress on the incomplete retrocession of the splenic tumor with the occurrence of a pyrexia in enteric fever as pointing to the danger of a relapse. This reaction of the spleen is explained by its anatomical structure, which permits of a very abundant blood-supply; and the view most largely held as to the action of infection is that it leads to a paralysis of the vascular muscles, and thereby an hyperæmia and swelling of the organ. More recently pathologists agree in ascribing the temporary enlargement to congestion, and the more permanent form to an inflammatory process. The condition of the viscus in cholera is altogether a striking one; for at the height of this terrible disease—that is, in the algid stage—there is not only absence of enlargement, but the normal dullness of the organ is scarcely perceptible, while in the stage of reaction—where the grave symptoms of infection are at an end—the usual splenic tumor makes its appearance. Botkin had already pointed out that in some cases during the preliminary diarrhoeic stage increased dullness could be determined, but this entirely disappeared during the succeeding cold stage. Still more interesting is the action of cholera upon the spleen in those cases where a patient suffering from enteric fever was attacked. Three such cases have been recorded during the recent Hamburg epidemic. In these the high temperature sank to 95° F. (35° C.) and under, and the splenic tumor disappeared. One of the patients died of cholera; in the second case, with the cessation of cholera, the enteric fever subsided; while in the third case, after fourteen days' apparent convalescence, the typhoid fever recurred, and with it there was a return of the splenic enlargement. The question now of interest is, What is the factor which inhibits the infectious enlargement in the height of cholera, or removes an already existing enlargement? The explanation that first of all presents itself is the copious withdrawal of fluid from the blood that takes place in cholera. This is, however, not altogether satisfactory, as even those cases during the Hamburg outbreak which rapidly fell into the algid state without loss of fluid showed no increase in the spleen; and further (what is very noteworthy), after

that stage passed off, a splenic tumor appeared, although the diarrhoea, and especially the vomiting, continued. Botkin had already suggested the influence of irritation of the vasomotor nerves, as shown by the small and feeble pulse with strong cardiac action, cyanosis of the face, etc.; and as the muscular structure of the splenic net-work has a similar innervation to that of the blood-vessels, the analogy would hold good. Klebs has, from his experience in Hamburg, come to the conclusion that contraction of the arteries is a pathognostic sign of cholera, and that cramp of the voluntary muscles comes under the same category. He explains it on the ground of irritation of the intestinal nerves, which produces vascular spasm; and to account for the long duration, suggests that it is primarily paralysis of the vaso-dilators. Stiller is of opinion that the most rational explanation is, that the vascular spasm and the contraction of the spleen at the height of the disease are to be ascribed to the action of the poison; and while that is the most important, one cannot exclude severe irritation of the intestinal canal and copious withdrawal of fluid from the blood.

Stomma, of St. Petersburg, ^{Aug. 29}⁶ has carried out an investigation into the condition of the cardiac ganglia and of the solar plexus in cholera. His material consisted of twenty fatal cases. He finds that in very rapid cases—where death occurs in one or two days after the commencement of the symptoms—both the solar plexus and the cardiac ganglia present an œdematos appearance of the nerve-cells, there being a slight turbidity and swelling of some of these and also of some of the endothelial cells. When the case has continued for from two to four days, before death has occurred, the turbidity in the nerve-cells is more marked. Changes in the endothelial capsule are indicated by turbidity of the protoplasm and by swelling with signs of commencing activity of the nuclei; there is also more or less infiltration by round granulation elements both into the connective tissue and into the cavities of the capsules of the nerve-cells. In cases where death has not occurred until after four days or more from the commencement of the disease the nerve-cells show signs of fatty degeneration in different stages, and there is marked proliferation in the endothelial capsule, the cells forming layers and exercising pressure on the nerve-cells. There is also a large amount of infiltration by granulation elements in these cases.

N. I. Kuskoff, ⁸⁵⁹_{No. 40, '92; Dec. 3, '92},² states that in all the bodies of cholera patients examined by him microscopically he discovered the presence of characteristic hepatic cells in the vena portæ and hepatic veins. The elements were lying partly free in the blood, partly imbedded in thrombi. They occurred mostly isolated, but now and then were met with in groups of two, three, or four cells, forming then the characteristic figures of hepatic trabeculae. Frequently they appeared to be perfectly intact, but as a rule they showed signs of a more or less pronounced degeneration. The hepatic parenchyma was always found to contain extravasations and necrotic areas, the disintegrated foci sometimes communicating with the lumina of the hepatic vessels through rents in their walls. In one case the cells were seen in the cardiac vessels as well, while in some cases they were also present in the lungs and kidneys. Occasionally the vessels were found to contain cylindrical-celled epithelium of the biliary ducts, in addition to the hepatic cells, and even various elements of the splenic parenchyma were observed. The author adds that he frequently detected hepatic cells in the portal and hepatic veins in cases of influenza.

Th. I. Romanow ⁵⁸⁶_{No. 34} describes special corpuscles found in the capillaries and small veins in a choleraic liver. Isolated, or in groups sufficient to obstruct the capillaries, these corpuscles have the size and form of red globules, which they often accompany in the vessels. They are distinguished by their fatty appearance, yellow color, and histo-chemical reaction. They do not color by eosin, haematoxylin, or carmine; creasote and Canada balsam make them clearer; osmic acid dyes them black, but by Russell's method they take the fuchsin at the same time that the base of the preparation takes a green color. Ferrocyanide of potassium and hydrochloric acid color them blue, and sulphate of ammonia black. This pigment gives the reaction of iron, and the corpuscles are probably derivatives of the red cells formed while living.

After a careful study of three cases that had died in the algid stage, and a fourth in which death was due to uræmia, Aufrecht ³¹⁹_{Nov. 12, '92} concludes that (1) cholera-nephritis may occur without the algid stage; (2) the more marked changes are in the papillary region of the kidney; (3) the changes in the renal cortex are best explained by the stagnation of the urine in the tubules in consequence of the obstruction caused by the casts in the papillary

region; (4) cholera nephritis is not due to mere thickness of the blood brought about by the loss of fluids by the body. Thus the explanation remains that some toxic substance is absorbed into the blood and injures the epithelial elements of the kidney, especially in the papillary region.

After a careful microscopical examination of the brain and spinal cord of two typical cases of cholera, Popoff⁵⁸⁶_{n.o.22} concludes that the disease is accompanied by intense morbid alterations, which most closely resemble those met with in cases of Hayem's "acute hypertrophic encephalitis."

Predisposition.—M. Rekowski, of St. Petersburg,¹¹⁰¹_{p.67,72} thinks that the healthy human body does not furnish a congenial ground for the specific bacillus. Out of 39 persons, mostly of the pauper class, who died of cholera, and were examined at the Hospital of St. Peter and St. Paul in 1892, the following results were found as to the presence of other diseases:—

	Cases.	Per cent.
Nephritis chronica interstitialis	35	90
Dilatatio ventriculi	28	70
Sclerosis cranii	18	45
Cirrhosis hepatis	16	40
Gastritis glandularis	15	37
Pleuritis adhesiva	8	20
Atheroma aortae et arteriarum cerebri	7	17
Endocarditis vegetativa	4	10
Pachymeningitis	3	7.5

In 21 women, in whom autopsies were made, abortion was found to have occurred 7 times. In summing up, this investigator concludes that insufficient nourishment, alcoholism, and, in addition, among females, a faulty treatment of abortion and parturition, open the door of the human economy to the entrance of different micro-organisms, which, by their simultaneous action, increase the pathogenic action of the cholera bacillus.

In the opinion of Thomas²⁷³_{Aug. 24} alcohol increases six times the degree of predisposition, in a given individual, to choleraic infection, not only by modifying cellular function and causing vascular troubles, but also by decreasing the bactericidal power of the blood.

After referring to the great mortality of cholera amongst the alcoholic, Gaillard³⁶⁰_{Oct. 1, Oct. 21} discusses the subject, with illustrative cases, under three headings: 1. Mild cholera. Here the disease may sometimes be followed by delirium tremens, or a hitherto

mild attack may suddenly develop serious symptoms, delirium heralding the change. When a mild attack thus becomes grave, it is nearly always due to some defect in the individual, such as alcoholism, etc. 2. Severe cholera, (*a*) with ordinary course. In the very acute disease there is no time for any individuality on the part of the patient to declare itself. Six such cases are recorded. They were all fatal, but the author thinks that life was prolonged by transfusion in two of them. This severe cholera in alcoholics is not necessarily fatal, but a favorable result is not frequent. (*b*) With alcoholic delirium. Delirium is a common event in severe cholera, but it rarely has the violent character of alcoholic delirium. (*c*) With cerebral engorgement. This is shown by redness of the face, injection of the conjunctivæ, and always by elevation of the internal temperature. A case is referred to in which pneumonia supervened, and at the necropsy there was much œdema of the meninges. (*d*) With predominance of gastric symptoms. Here the intolerance of the stomach may be intense, and everything is vomited. (*e*) With jaundice. Jaundice is not common in cholera, and the author believes it to be often connected with alcoholism. (*f*) With prolonged hypothermia. (*g*) With pneumonia. Alcoholism singularly predisposes to pneumonia. Out of 5 cases, 4 were alcoholics. In 3 out of the 4 the disease was bronchopneumonia, and was unaccompanied by fever. 3. Therapeutic considerations. The author would not give alcohol except in the stage of reaction. Iced coffee is better tolerated than champagne. He uses various kinds of lemonade, made with citric, tartaric, or lactic acid. In the case of the latter, 15 grains (1 grammé) of lactic acid is added to 1 to 1½ litres (quarts) of sweetened water. The author thinks morphine given subcutaneously less objectionable than opium, but he reserves it for severe cramps or delirium. There is nothing to take its place in the delirium of these patients. Neither chloral nor bromides can be given, for they produce vomiting. Warm baths must be used cautiously, since they have been known to call forth convulsions.

Prognosis.—Happe⁶⁹ shows, from the statistics of Hamburg hospitals, that the prognosis of Asiatic cholera in young children is exceedingly bad. Of 4129 infants, aged 1 year and under, 80 per cent. died; of 1701 children, from 1 to 5 years, 75 per cent. died; of 1731 children, from 5 to 15 years, 45 per cent. The

mortality was much higher at the beginning of the epidemic than at the end.

Ratjen ⁷⁴ _{See, 1902} states that of 258 cases of cholera observed by him, 180, or 69.7 per cent., terminated fatally. Of 177 cases of diarrhoea, 2 were fatal (children under 2 years). Of 85 patients seen in the algid stage, 48 died. The mortality according to age was as follows: Under 2 years, 12 fatal cases, 2 recoveries; 2 to 10 years, 20 deaths, 16 recoveries; 10 to 15 years, 3 deaths, 2 recoveries; 15 to 20 years, 4 deaths, 9 recoveries; 20 to 35 years, 50 deaths, 26 recoveries; 31 to 50 years, 51 deaths, 18 recoveries; above 50 years, 40 deaths, 4 recoveries.

Diagnosis.—Koch ⁵⁸ _{B.I.G.B.Z. June 11,} draws attention to the fact that it is now admitted, even by those who deny the causal relation of the comma bacillus to the disease, that this organism is invariably present in all cases of cholera, and that, moreover, it is not found under other conditions. This being the case, it is important that the presence of the cholera vibrio should be easily and rapidly demonstrable. The plate method, though useful where the organisms are present in large numbers and where a couple of days are available for the process, fails to supply early enough that diagnostic information which is often so important where means have to be devised for preventing the spread of this disease. Koch has, therefore, for some time past, been working out the best means of recognizing the comma bacillus in the dejecta from cholera patients sent for examination to the Institute for Infectious Diseases in Berlin. His methods are primarily for use in the case of dejecta only, but wider experience of one of them has convinced him that they are equally valuable in helping to determine the presence of the vibrio in water fouled by dejecta from cholera patients.

In about half the cases examined a rapid microscopical examination of the materials forwarded to him from various parts of Germany enabled him to telegraph, almost immediately, that the patient from whom the dejecta had come was affected with cholera. In the mucous threads and flakes examined under the microscope the cholera bacilli are arranged in groups in which the single bacilli run parallel to one another like small fish moving in a shoal in a stream of water. This appearance Koch regards as so characteristic that where it is present he does not hesitate to base a diagnosis upon it. In nearly half the cases this microscopical

examination was insufficient, and it was necessary to have recourse to culture methods. Dunham, working at the "cholera-red" reaction, suggested a 1-per-cent. peptone solution with $\frac{1}{2}$ per cent. of common salt as a medium in which the organism would grow, and would in its growth reduce the nitrates to nitrites, and also form indol, so that on the addition of hydrochloric or sulphuric acid the "red" reaction was readily obtained. Dunham then found that this peptone method had a still greater value, in that the cholera vibrio grew in this mixture at an enormously greater rate than the other organisms found in the alimentary tract, and in that, from the fact that it has a great "oxygen hunger," an almost pure culture may often be obtained from the surface of the peptone medium. Koch finds that even better results are obtained by the use of 1 per cent. instead of $\frac{1}{2}$ per cent. of salt, and by utilizing this method, along with the gelatin and agar plate-cultures and Hueppe's method of intra-peritoneal injection, he was able to make an accurate and rapid diagnosis in all the cases submitted to him. The cholera-red reaction could be obtained in about six hours, and colonies can be recognized on agar plates in from eight to ten hours. The presence of the cholera vibrio was demonstrated in certain waters,—the Elbe water, as met with at Hamburg, Altona, and Neitleben, and also in a well at Altona; in slop-water and tap-water at the Institute of Nietleben,—the decisive proof being furnished in every case by the presence of the cholera-red reaction and by experiments on animals.

With these rapid methods at command, it may be hoped that in future we shall hear less of choleraic and cholera-like diseases in our sea-port towns, and that the authorities will not be satisfied until the medical officer of health is able to inform them definitely as to the true nature of such cases, especially when they have been imported from suspected districts.

This diagnosis can, of course, only be relied on when made by those who have taken the trouble to acquire a knowledge of the technique, and to master the bacteriological methods involved in the somewhat delicate operations involved in the carrying out of this process. Once mastered, however, the method should prove both rapid and reliable, and should greatly strengthen the local government boards in carrying out preventive measures against the spread of cholera in this country.

Freymuth and Lickfett⁶⁹,₁₉ diagnosed a case of cholera within six hours, in a boy who had neglected to wash his hands before eating a meal. He had previously handled and cleaned some laboratory instruments used in making cultures. Lickfett spread over a sterilized lamella a thick layer of the following mixture: Koch's bouillon, 900 cubic centimetres (29 ounces); glycerin, 12 cubic centimetres ($3\frac{1}{2}$ fluidrachms); agar-agar, 12 grammes ($3\frac{1}{2}$ drachms); gelatin, 30 grammes (1 ounce). This mixture was heated. When the layer had cooled, some of the faeces were spread over it, and the plate placed in a damp room at a temperature of 38° C. (100.4° F.). In six hours small colonies of the comma bacillus were found.

Schiller⁶⁹,₂₀ warmly recommends glycerin-agar plates. Tubes containing agar are inoculated in the usual manner, plates prepared and then placed in an incubator, and in most cases it will be possible to make a diagnosis in about six hours. Colonies will have appeared by that time, and these may be fished out under low or high powers of the microscope. The deeper colonies should be preferred to the more superficial ones. These show, as a rule, typical spirilla and S-shaped forms. On examining the colonies directly with a Zeiss DD; Oc. 4, motile and fixed commas or spirilla will be seen.

Symptoms and Complications.—Repeating the observations of Coste and Josias on the prognostic value in cholera of the condition of the pupillary and patellar reflexes, Gailliard¹⁵²,₁₅₁ June 29; Sept. draws the following conclusions from a personal examination of 160 cases: 1. Pupillary mobility, while not having the value which Coste attributes to it, is a favorable indication. 2. Sluggishness of pupillary movement has scarcely any significance whatever. 3. Immobility of the pupil, a symptom not at all characteristic (seen in only 28 patients of 133 cases which passed into the algid stage), is an unfavorable phenomenon. As regards the patellar reflex: 1. Its increase (rarely seen) is unreliable. 2. Its retention is favorable. 3. Its abolition (seen in about half the cases) is unfavorable. The question arose as to the existence of any relation between the two reflexes, and the value of their simultaneous retention or modification. It was found that of 3 algid cases preserving both reflexes 2 recovered and 1 died, while of 3 algid cases in which both reflexes were lost 2 died and 1 recovered. In other words, if a cholera patient

who has passed into the algid stage retain both reflexes he has two chances out of three of recovery, but if both have been lost he has only one chance out of three. From observations of 400 cases of cholera the same author ^{236 27} _{Mar. 1, Sep.} states it as his opinion that pregnancy constitutes by far the most serious complication, ranking before even senile debility, alcoholism, and phthisis. Lactation, however, does not seem to be a serious complication. Out of 10 patients attacked by cholera, all of whom were nursing their own children, and several of whom were in a state of extreme debility, 6 recovered. The mammary glands are very frequently engorged and painful. The diarrhoea of cholera, which suppresses the activity of the kidneys, dries tuberculous cavities, and causes, as if by magic, the disappearance of hydrothorax, ascites, and oedema, has no analogous action upon the secretion of milk. Magendie finds an explanation of this phenomenon in the situation of the mammary arteries near the heart.

J. Koffmann ²¹ _{Oct. 14} observed, during the epidemic of 1892, 8 cases of pregnancy in women suffering from cholera. In 2 abortion did not occur; 1 of these died and the other recovered. Abortion or premature labor occurred in the 6 other cases, and only 1 case recovered. Of the 5 fatal cases, 3 succumbed from suppurative parotitis with facial erysipelas, 1 from malignant angina, and 1 from puerperal eclampsia. The author insists on the danger of suppurative parotitis. In one case everything was done to overcome this complication by asepsis and care of the mouth, but without success. In another case a bacteriological examination of the pus was made, but cholera bacilli were not found. Koffmann concludes that cholera in pregnant women generally terminates in death.

Galliard ³⁶³ _{Apr. 15} states that the frequency of pneumonia in cholera varies according to the epidemics, and generally occurs in the period of reaction. Cold, advanced age, alcoholism, and organic taints may be factors, while individual predisposition is of insignificant importance as a cause. The pneumonia is often latent; fever may be absent, especially in the most common form, broncho-pneumonia, in which reaction is less severe and all the symptoms attenuated. On the other hand, a temperature of 39.9° C. (103.8° F.) has been observed in the fibrinous form (Oddo). Hypothermia is not rare in broncho-pneumonia. The progress of this complication of cholera is extremely rapid and its termination generally fatal,

though cases of recovery have been recorded. Rommelaere is the only author who has found the comma bacillus in the affected areas; Mills detected it in the sputum.

B. Greidenberg⁵⁸⁶ has observed a case of acute maniacal exaltation in the convalescent period, which ended in recovery in two weeks. Kraepelin²¹ saw seventeen cases of psychical disturbance in cholera. Camuset⁹⁴ made some observations on the mental condition of insane patients suffering from cholera. The disease invariably caused the disappearance of mania, no matter how intense, or of how long duration, but the cure did not persist. Of twenty-one cases, there was but one exception. When there was maniacal dementia, this was temporarily changed to simple dementia. Most of the patients, except idiots and imbeciles, seemed to understand their condition during the dangerous periods of the disease, and to look calmly upon the prospect of death.

The influence of cholera on melancholia was rather to increase the depression. The patients fell rapidly into a state of prostration, and delirium continued to the end. In the delirium of persecution there was no observable improvement. Excitement disappeared, but systematic delirium persisted. A case of general paralysis was also not modified. A patient with chronic alcoholism was attacked by the disease, the delirium disappearing at once, and the patient dying in great terror. Two patients suffering from hysterical mental debility recognized their hopeless condition.

Didier²⁰³ observed two cases of an eruption of the skin during the course of cholera. It was especially abundant on the back, abdomen, and thighs, and consisted of small, round, more or less irregular maculae, about the size of a dime. In one case there was also intense pruritus. The eruption disappeared in a couple of days and no desquamation followed.

Galliard,¹⁴ from two cases of typhoid fever occurring coincidentally with cholera, believes that if cholera supervene during the stage of incubation of typhoid fever the exterior manifestations of the latter disease may be retarded. The occurrence of typhoid in distant antecedents does not predispose to cholera nor modify the disease. In the discussion Netter recalled the fact that certain localities in France were especially affected. At Sarcelles, for instance, the death-rate was 240 per 10,000, while at Hamburg it was only 122 per 10,000. However, here, as in other communes

about Paris, although a large number of cases of typhoid fever had been observed at the same time as the cholera,—a coincidence entirely explained by the impurity of the water,—not a single case was noted in which both diseases occurred simultaneously in the same patient.

Chantemesse thought it likely that in Galliard's cases the typhoid fever did not really begin until after the cholera, the bacillus of which would naturally favor the action of Eberth's bacillus. Rendu thought the evidence in favor of the theory that the action of each microbe was intensified by the presence of the other.

Zapolksi-Downar, of Lublin,⁵²⁰ ¹⁰⁹ No. 47, 192; Jan. states that, in such cholera cases which pass into the typhoid stage, there supervenes a total anaesthesia of the cornea, no reflex phenomena being induced, either by touching the structure with a finger or by flies which manage to get access to the patient's open eyes. In the absence of appropriate precautions, such patients are very liable to contract corneal ulceration, the process being due to local irritation by dust and flies, as well as to the agency of some microbes present in the dust or introduced by the insects. According to the author's observations upon scores of such cases during the recent epidemic of cholera, the ulcers mostly attack the lower segment of the cornea, and have either oblong or arcuate outlines. Occasionally, however, they are situated in the central area of the membrane, assuming a circular form and sometimes penetrating deeply into the proper tissue of the cornea. In four cases of the latter category seen by the writer the ulcer involved Descemet's membrane, while in two hypopyon was present, and in one a cornical perforation with prolapse of the iris occurred.

Martin Durr⁹² observed, during the epidemic of 1892, a case of limited gangrene of the first interosseous space of the left hand consecutive to the obliteration of the brachial artery, in a man of 48 years, in the reaction period of cholera. Pallor of the forearm and the left hand suddenly appeared, with a greenish-yellow discoloration of the skin, falling of the temperature, violent cramps in the hand and forearm, and suppression of the radial pulsation. Three hours afterward there was complete amelioration, disappearance of the pains and coldness, and re-appearance of the radial pulsation. The next day there was a fresh attack of local algidity with pains, and a gangrenous area appeared, with anaesthesia of the

skin. Recovery followed removal of the gangrenous portion, but with persistent arterial obliteration for four months afterward and pronounced atrophy of the member.

Prophylaxis.—The very interesting experiments in protective inoculation of Haffkine, of Paris, were detailed in full in last year's ANNUAL (vol. i, page D-5). The subject is ably discussed by Klemperer.^{Dec. 12, 1892; Jan. 7} According to recent views, it might be looked upon as debatable whether guinea-pigs are protected by the method of subcutaneous inoculation. Klemperer injected guinea-pigs with increasing doses, and fourteen days later he administered, after the soda-opium treatment, 5 cubic centimetres of a cholera culture. These animals lived, whereas the control ones died. He also shows, by new experiments, that guinea-pigs can be protected by way of the stomach. It has been further proved that this acquired immunity can be transferred to other animals. With regard to the conferring of immunity on man, it should be remembered that cholera in the guinea-pig is an intoxication, while in man it is a true infection. The author holds it as probable that a man whose blood-serum will confer upon animals a high degree of immunity against cholera intoxication is also himself protected against the infection. It is generally agreed that a second attack of cholera is rare. The protective properties of the blood-serum artificially induced should be equal to those possessed by the blood of those who have recovered from the disease. The author then records experiments by which he conferred immunity upon guinea-pigs by the injection of blood-serum from two persons cured of cholera. These two cases, along with two by Lazarus, make four cases in which high antitoxic properties of the blood are shown. There was a great difference in the amount of blood-serum required, probably because the interval between the attack and the experiments had been long in the author's cases. The protective action of the blood-serum from a medical student who had previously received subcutaneous injections of virulent cholera cultures was shown, by experiments on guinea-pigs, to be greatly increased; and it was also greater than in the blood-serum of two patients who had recovered from mild attacks of cholera. The author thinks that this medical student is protected against cholera. The practical application of this method can, for several reasons, hardly be expected. The author himself took increasing doses of bouillon

cultures, which had been killed by being heated for two hours up to 70° C. (158° F.). No disagreeable effects were produced. The blood-serum was found to have considerable antitoxic effects upon guinea-pigs. Subcutaneous injections of the milk from a goat artificially made immune were given to a man. The injection of 5 cubic centimetres (1½ fluidrachms) of this milk produced such a degree of immunity that 0.25 cubic centimetre (4 minims) of his blood-serum protected a guinea-pig against cholera intoxication. There is hardly any doubt that goats may be made more resistant by further injections, and that their milk will thus have greater antitoxic properties. The author thinks it permissible to hope that the injection of 1 cubic centimetre (15½ minims) of such goat-milk will protect men not only against the intoxication of cholera, but also against the infection.

Vincenzi, ⁶⁹ _{May 4; May 27}² in a paper upon the properties of the cholera vibrio, states that the organism develops luxuriantly in the blood-serum of healthy guinea-pigs. The animals can be rendered immune by the filtrate from bouillon in which the vibrio has been grown, or by cultures which had been raised to temperatures between 65° and 120° C. (149° and 248° F.) The blood-serum of animals thus rendered immune kills the vibrio very quickly. With this blood-serum other animals can be rendered immune, and the simultaneous injection of the vibrio and the serum produces no effect. When the disease has commenced in guinea-pigs, it may sometimes be stopped by injecting immunized serum into the blood-vessels. The dried serum retains its power of rendering an animal immune.

J. Sawtchenko and D. Sabolotny, ⁸⁵⁴ _{Aug. 24} in a paper on immunity against cholera, state that injection of cultures of cholera bacteria killed upon agar and treated afterward by carbolic acid gives to human blood immunity against the cholera vibrio. By the preliminary injection of cultures killed upon agar it is possible to prevent lesions produced by the penetration in the intestine of the virulent vibrio of Koch. The evacuations of persons possessing immunity against cholera, while having the appearance of normal health, sometimes contain a great number of the Koch bacilli, and are capable of propagating the infectious germ. These facts, demonstrated experimentally, agree with the observations of Rumpf, who often found cholera germs in the normal evacuations

of persons living in the vicinity of cholera patients or in an infected district. Such evacuations are dangerous because, although having passed through the intestines of persons possessing immunity, they have not lost their initial virulence.

From the highly-interesting lecture delivered by Yavein,<sup>586
Nov 7, 8</sup> before the Board of the Military Medical Academy in St. Petersburg, the following conclusions may be drawn: 1. At the present time we cannot speak of specific toxins excreted by the kidneys, because in all cases in which the urine contains the specific toxins it also contains specific and noxious microbes, and it is, therefore, quite impossible to determine whether the toxins in the urine are excreted by the kidneys, or whether they are formed in the urine itself. 2. The urine of rabbits which have died after infection by Fraenkel's diplococcus, diplococcus of erysipelas, anthrax bacillus, and the bacillus of hog-cholera always contains the corresponding microbes, as well as other noxious bacteria in great quantities. 3. The urine of rabbits dying after having been infected by the cholera comma bacillus in the abdominal cavity, sometimes contains the specific microbes and sometimes not; the urine of guinea-pigs which have died after infection in the abdominal cavity with cholera bacilli never contains the specific microbes; and, finally, the urine of rabbits which have died after repeated injections of a great number of cholera comma bacilli under the skin contains neither the specific microbes nor specific toxins. 4. The urine of rabbits infected with hog-cholera bacillus, diplococcus of Fraenkel, or streptococcus of erysipelas contains the specific microbes a few hours after infection. Sometimes the urine of rabbits infected with the hog-cholera bacillus does not contain the microbes for many hours after infection. In these cases it was impossible to find the specific toxin, although there is found in the same urine certain substances which occasion immunity. (Report of Corr. Editor Drzewiecki, Warsaw.)

Treatment.—A very suggestive lesson is furnished by the remarks of a correspondent.<sup>42
July 28</sup> "One must have seen," he states, "how European merchants in Calcutta remain healthy, although the population of that city is visited with cholera year in and year out. The newly-arrived European is as readily susceptible to cholera as the native, but the settled merchants who live cleanly and in a regular manner are as if charmed. They do not under-

stand the dread of cholera of the European. It is seen from this that the manner of living is of great importance. The villas of the Europeans are situated on the same soil as the houses of the natives; the European, however, has a good water-supply, eats only food that has been prepared, does not come into contact with cholera patients, and does not live in small, confined rooms. This suffices to protect them from cholera. Amongst ourselves there is a similar difference in the mode of life between the well-to-do and the poor, and the educated and the uneducated. The former are strikingly spared, and this lies only in the manner of life of those better situated. Another thing of importance is that the lower classes do not so readily fall in with the directions of the physician, and are but little accessible to instruction. Even these, if they adopted a more suitable manner of living, would more easily escape the disease."

In an editorial ⁶ attention is drawn to the views held by many men of wide experience on a practical point of importance, viz., the risk that attends the use of purgative medicines, and salines especially, during periods of epidemic cholera, and at places where that disease happens to be prevailing. Physicians who practice in India seem to have recognized the danger of strong purgatives. In a recent report, Neve, our corresponding editor at Kashmir, wrote that he had known of a large number of cases in which, under appropriate treatment, purging and vomiting had been stopped, and the patients apparently recovered, but which were afterward brought back to a fatal state of collapse by the administration of purgatives of an irritating nature. He also observed the failure of eliminative treatment in the hands of native physicians (hakims).

It is not, of course, intended to imply that aperients give rise to attacks of Asiatic cholera. During the prevalence of cholera in a locality, however, there is often at the same time much diarrhoea prevalent, which, whatever be its exact nature, does not develop into cholera. The inhabitants of an affected locality may be said to be for the time in a state of unstable equilibrium, and a saline purgative or an indigestible meal may be the exciting cause of an attack of the disease. When cholera is present, aperients of the mildest and simplest kind should alone (if at all) be used, and the fact seems worth bearing in mind when the custom of

having recourse to saline purgative water of different kinds is so common.

Opium is, as usual, recommended in the majority of papers on the treatment of cholera, and forms the basis of almost all the early measures advocated in the literature of the year.

F. C. Nicholson, of the Bengal medical service, ¹⁵ states that as soon as a person shows the premonitory symptoms of cholera, by having one or two large watery motions passed with little or no pain, and begins to vomit, it is best to put him under the influence of opium at once. All physicians who have had much to do with the treatment of cholera in India are agreed in this; and it is noteworthy that many so-called cholera "specifies," which have from time to time been popular, contain opium in some form. On the other hand, H. Webster Jones, of London, ⁶ had observed that practitioners usually found their patients had already put themselves under the full influence of drugs before seeking advice, many being stupid with opium. In his own clientele such cases speedily succumbed, as it appeared largely because of a medicinal aggravation of the glandular and secretory torpor characterizing the *prima viae* during the course of the attack. The author used, instead, a powder or a freshly-made pill of calomel, $\frac{1}{6}$ grain (0.01 gramme); piperine, $\frac{1}{4}$ grain (0.016 gramme), and sugar of milk, 3 grains (0.2 gramme), every ten, fifteen, or twenty minutes *pro re natâ*, until feculent matter ("floating islands") appeared in the stools. The early successes of this plan were so decided as to gain for it much confidence. Illingworth ²² recalls his objections to opium in cholera, published some years ago.

Tchekünoff ⁸⁰ _{Mar.} emphasizes that opium secures beneficial results in the treatment of Asiatic cholera, and that, notwithstanding all modern opposition against the drug, it will retain its place amongst the chief weapons against the disease. (His mortality list shows 64.7 per cent., however.)

Eichhorst ²¹¹ _{Sept. 15, 192; Nov. 1, 192} ²⁶ warmly advocates the internal use of opium, the remedy having given "best results" in his hands during a cholera epidemic at Königsberg. In the presence of gastric catarrh, with its defective secretion of hydrochloric acid, the drug should be combined with the acid,—for instance, after the following formula: R^y Acidi muriatici, 5 grammes (1½ drachms); tincturæ opii simplicis (*Ph. Helv. vel Germ.*), 2 grammes (½ drachm);

aqua destillatæ, q.s. ad 180.0 (5 $\frac{3}{4}$ ounces); syrapi simplicis, 20.0 (5 drachms). M.D.S.: A tablespoonful every two or three hours.

It will be remembered that Ziemssen most highly recommended calomel as far back as 1855, beginning its use as soon as the choleraic diarrhoea appeared. Two or three doses of 7 $\frac{1}{2}$ grains (0.49 gramme) each are administered, followed by small doses of $\frac{5}{6}$ of a grain (0.05 gramme) every two hours. Ziemssen ⁸⁰_{Mar. 16} recalls the excellent action of calomel in the beginning of typhoid, and also the equally favorable experiences in the fermenting diarrhoea of childhood, and thinks this is due to the well-known fact that a portion of the calomel becomes changed in the intestine to corrosive sublimate; and as corrosive-sublimate solutions have a fungus-destroying action in a strength of 1 to 30,000, it is easy to believe that the bacilli in the intestine are directly killed by the calomel.

Van Hasselt ⁵⁸³_{V. 32} treated 51 cases with 15 deaths. He advises the immediate use of calomel, not forgetting to give hydrochloric acid at the same time. He mixes the calomel with a little water and gum powder, placing the mixture on the tongue, thus avoiding touching the teeth. The first dose is 1 gramme (15 $\frac{1}{2}$ grains), repeated several times. Even in convalescence 0.1 gramme (1 $\frac{1}{4}$ grains) is given hourly. He avoids the use of opium.

Treymann, of Riga, ²²_{Apr. 19} strongly advocates the administration of calomel in doses of 0.03 to 0.06 gramme ($\frac{1}{2}$ to 1 grain) given every hour. In this connection F. Peyre Porcher ⁵⁹_{Nov. 26, '92} recalls the treatment recommended by Calhoun many years ago, and which, though heroic, was said to obtain far superior results to those reported, as far as the proportion of cured cases is concerned. "I prescribed calomel, 10 grains (0.65 gramme); gum camphor and tannin, each 5 grains (0.32 gramme), every half-hour or hour, as the urgency of the symptoms demanded, until the diarrhoea was checked and the secretions restored to a healthy state. In combination with the above substances I occasionally prescribed opium. I must not omit to mention that in some cases the irritability of the stomach was so great that this combination could not be retained; in these I gave calomel alone internally, restrained the discharges by astringent injections, and applied sinapisms to the abdomen and extremities. After the formidable symptoms subsided no further treatment was necessary, the patients entering promptly into convalescence. By pursuing the plan of treatment laid down

in the premonitory stage I did not lose a single patient; the four that died were not reported until they were collapsed, or nearly so. On another plantation forty cases occurred, of which number two died."

Huberwald ³⁶⁶_{B.35.H.3; May 18} recommends quinine. A grain and a half (0.1 grammie) may be given every two hours for twenty-four hours, and repeated during a second twenty-four hours if necessary. If vomiting be present and beyond control, the drug should be injected beneath the skin. In the gravest cases subcutaneous injection must be unconditionally practiced. For this purpose the hydrochlorate or the sulphate, dissolved in acid and diluted with water, may be employed. Still better is the use of the carbamidated hydrochlorate. Of this, from 12 to 15 grains (0.78 to 1 grammie), dissolved in an equal part of water, may be injected. The preparation may be also administered, dissolved in water, together with extract of glycyrrhiza, to children who cannot swallow cachets. This method of treatment is also applicable to cases of cholera nostras. E. B. Fullerton ⁵⁰_{Oct. 1, '92} strongly emphasizes the value of quinine. He suggests that 1 drachm (4 grammes) be dissolved in 3 ounces (93 grammes) of water by means of a sufficient quantity of dilute or aromatic sulphuric acid, and that of this solution a tablespoonful be administered and at once repeated if vomiting occur, and afterward at intervals of an hour and a half, until 30 grains (2 grammes) have been taken, and thereafter *pro re natâ*. If judged best, a small amount of morphine may be added.

Walkowitch ³_{No. 66} is convinced that salol is an excellent remedy against choleraic diarrhoea, provided it is administered in larger doses than are usually given. He administers to adults, on the first day, up to 8 to 10 grammes (2 to 2½ drachms) during the twenty-four hours. He begins with a dose of 2 grammes (30 grains).—1 grammie (15 grains) in the aged or feeble,—followed every three hours by a dose of 1 grammie (15 grains). Then, as improvement becomes manifest, this dose is given every four, five, or six hours. Piatnitzky, of St. Petersburg, ²⁰⁵¹_{No. 8, p. 97; July} also recommends salol in 5-grain (0.32 grammie) doses, for an adult, repeated hourly as long as required by the necessities of the case. The drug is said to mitigate rapidly all choleraic symptoms, or even to cut short the disease.

Girode ³_{May 21} describes a case in which two concretions composed

of salol were found in the stomach after death. The patient died of cholera. At the autopsy it was noted that in the most pendent part of the stomach were two projecting masses, around which the mucous membrane was congested. On opening the organ two masses of salol were found, one weighing 1.559 grammes (24 $\frac{1}{4}$ grains), the other 1.259 grammes (19 $\frac{1}{2}$ grains). Salol had been administered in moderate doses for two days during her illness, and then discontinued because it caused vomiting.

F. Odartchenko, of Belgorod, <sup>586, 109
No. 14, 1921, Jan.</sup> highly recommends the internal use of nitrate of silver; beginning with doses of $\frac{1}{15}$ to $\frac{1}{8}$ grain (0.004 to 0.008 gramme), dissolved in distilled water. As soon as vomiting has ceased, which usually occurs after a couple of doses, the drug should be given in the dose of $\frac{1}{30}$ or $\frac{1}{40}$ grain (0.002 to 0.0015 gramme), several times daily. In the presence of profuse diarrhoea the nitrate should be employed in the form of enemata also. Of 106 cases treated by the author after this method, only 21 died, the remaining ending speedily in complete recovery. Odartchenko believes that nitrate of silver constitutes "an antidote for cholera toxins."

D. D. Stewart ^{Apt.} has found that alpha- and beta-naphthol had about the same power of restraining the growth or destroying the vitality of the comma vibrio. In the proportion of 1 in 16,000 they restrain the growth; in that of 1 in 3000 they kill in two hours, in that of 1 in 2000 in 5 to 30 minutes. He recommends resort to these drugs as preventives, and in the treatment of the early stage of cholera. He calculates from Sternberg's data that 5 grains (0.32 gramme) of naphthol in solution would render the entire small intestine proof against the introduction of the vibrio, and that under similar conditions 40 grains (2.60 grammes) would be germicidal. The maximum daily dose of either naphthol is commonly placed at 1 drachm, but much larger quantities might be given, as the toxic dose for a person weighing 143 pounds is said to be 8 $\frac{1}{2}$ ounces. As alpha-naphthol has a disagreeable taste and is said to be somewhat irritating to the mucous membranes in full doses, beta-naphthol is to be preferred as a prophylactic, and 5 to 10 grains (0.32 to 0.65 gramme), finely pulverized and perhaps mixed with white sugar, may be taken three to four times daily. In early choleraic diarrhoea he recommends similar or larger doses at shorter intervals. He also suggests that a saturated

solution of beta-naphthol, which is of the strength of about 1 in 1000 ($15\frac{1}{2}$ grains to the quart), might be used in the developed disease as the basis of the fluid used for injection in Cantani's method of enteroclysis.

Pasalsky²⁶,_{Ser. I, No. 24, p. 51} highly recommends the treatment of cramps by rubbing the affected areas with a piece of ice, the excruciating symptom being relieved with rapidity. He further advises to give internally calomel, in 10-grain (0.65 grammes) doses hourly for a few hours, after which enemata, made of a 1-per-cent. solution of tannic acid, should be resorted to, and repeated every two hours. No good results can be expected from the tannin injections alone, unless calomel is also given in the way described.

Klebs, of Zurich, made experiments at the Hamburg hospitals with a remedy which he discovered, and named anticholerin. This substance is obtained²⁷,_{Dec. 24, 1892} by filtering sterilized cultures of the cholera bacilli, and concentrating the filtrate over a water-bath; from this residue the allotoxins, which would be injurious to the animal organism, are precipitated by means of absolute alcohol; the autotoxins, to which the bactericidal, curative, and immunizing properties are ascribed, remaining in solution. It was successively shown that these latter substances are capable of preventing the development of cholera organisms upon agar and gelatin, with which they were mixed, as well as of checking the growth of the same organisms in cultures to which they were added. It was next demonstrated that anticholerin is not toxic to guinea-pigs, and subsequently the same fact was demonstrated with regard to man. It was further shown that guinea-pigs subjected to a preliminary treatment with the anticholerin are proof against cholera infection. The fluid that collected in the abdominal cavities of unprepared animals inoculated with cholera bacilli proved capable of affording protection to other animals. A favorable influence was also exercised upon inoculated animals by treatment with anticholerin.

It yet remained to verify in man the results reached in the lower animals. This part of the research was carried out at the Neues Allgemeine Krankenhaus at Hamburg, and the results are published by Manchot.²⁸,_{S. 45, 1892} Thirty-one cases of cholera of the severer types were treated with anticholerin, with 21 deaths, —a mortality of 67.7 per cent. Of 103 cases of the same kind

treated with saline infusions, 87 died,—a mortality of 84.5 per cent. The number of cases treated, it is true, is too small to permit of definite conclusions, but from all the circumstances there seems ground for believing that anticholerin possesses positive therapeutic virtues. The remedy was injected subcutaneously in doses of 1 cubic centimetre; on the first day repeated six or seven times; on the second day, five or six times; on the third day, three times; on the fourth day, once or twice. The frequency of injection was governed by the depression of the temperature, upon which anticholerin exercised a favorable influence, being usually followed by febrile reaction. Other measures may advantageously be conjoined with the employment of anticholerin. Enteroclysis, hypodermatoclysis, venous infusion, stimulation, and artificial heat each has its place, and is not to be omitted under the circumstances to which it is appropriate.

Angyan, of Budapest, ⁹_{Jan. 14; No. 49, '92} ⁸⁸ reported the results of the employment of anticholerin in nineteen cases of cholera of unusually severe type. Nine of the cases died,—a mortality of 52 per cent. It was found that the remedy exerted a most beneficial influence upon the course of the disease. In some cases slight transient febrile reaction appeared. Most of the symptoms soon changed for the better, diarrhoea and vomiting ceasing on the first or, latest, on the second day. Cyanosis, which would sometimes yield to hypodermatoclysis, frequently, however, to recur, disappeared permanently after the employment of anticholerin. The secretion of urine was resumed under the influence of the treatment, and soon attained respectable proportions; while in algid cases not treated with anticholerin the anuria would persist for three or four days. Although the number of cases was too small to lead to a final conclusion, the general impression was a favorable one.

I. F. Shorr, of Kherson, Russia, ¹⁰⁷⁸_{No. 13, '92; Mar.} ¹⁰⁹ having failed to obtain satisfaction by the ordinary means of treatment, tried to cleanse the digestive tract of its pathogenic elements by the following procedure: Every patient coming under his observation was at once made to drink as many tumblerfuls as possible of hot water, containing each three drops of hydrochloric acid. As soon as the patient had managed to successively imbibe six or eight tumblerfuls, manual abnormal pressure was resorted to in order to expel the liquid. Ten minutes after the vomiting had ceased the whole

cleansing procedure was repeated. As a rule, sickness after this decreased or even disappeared altogether. In exceptional instances, however, a third washing was performed three hours later. Simultaneously the intestines were cleansed by means of enemata, made of from 12 to 18 tumblerfuls of a hot 2.5-per-cent. aqueous solution of tannin, or, in the absence of the drug, of the same amount of plain hot water. The injection was usually followed by decrease of diarrhoea; but sometimes a second enema became necessary, being then administered about two hours after the first. When practicable, the measures were supplemented by a hot general bath, and a successive application of abdominal compress soaked in a hot, strong solution of kitchen-salt, and wrapping the whole body with hot sheets and blankets. Internally, the patients were given claret (boiled with cinnamon and sugar) and lemonade made of hydrochloric acid (ten drops to each tumblerful), a mouthful every ten minutes. In addition, some stimulant remedy (camphor, ether, caffeine with benzoate of sodium) was administered hypodermatically. He lost but 10 cases out of 66 thus treated.

Elmer Lee ⁵⁹ successfully tried the introduction of a soft-rubber tube one metre in length into the rectum, causing it to pass through the sigmoid flexure and enter the descending colon, and carry liquid as far, at least, as the ileo-cæcal valve. A large quantity (2 or 3 gallons—8 to 12 litres) of warm soap-water thus introduced effectively cleansed the intestinal canal, the interesting fact having been noted by him that the secondary effect of irrigation of the colon is to cleanse and relieve the small intestine of its contents. The patient was taken from the ambulance to the bath-room without delay, his clothes were removed, and he was laid on his back on the irrigating-table with the knees drawn up and the muscles of the abdomen relaxed; the long tube, after being lubricated with soap, was then gently pushed into the rectum, and urged by twisting and gentle pressure into the lower bowel as high as it could be made to go, and the stream of the previously-prepared solution of warm soapsuds, was allowed to run as freely as the tube would permit into the colon. When the colon became filled, the pressure exerted would force the water to seek an outlet back through the bowel into the rectum, and out around the outer surface of the tube into a properly-constructed receiving-vessel.

The average number of times that irrigations were given to each patient in the treatment of cholera in St. Petersburg was twice; occasionally a third irrigation would be given, but frequently one was found sufficient. Within one or two hours after the soap-and-water flushing of the lower bowel the patient would have from one to three or four evacuations, which would be followed by an interval of rest and cessation of from twelve to twenty-four or thirty-six hours. The relief of the spasm of the intestinal muscles, which produces the intense suffering, followed promptly upon the removal of the irritating contents, and the administration of morphine would not be required. In addition to this treatment the stomach was cleansed by irrigating it with a solution of salt and water in nearly every case. After this combined treatment, vomiting and purging would subside, in most cases, as soon as the patient was quiet. For internal treatment he used hydrogen dioxide, diluted with distilled water, given in cupful doses at intervals of three hours. The object of the administration of the hydrogen dioxide was to further cleanse and disinfect the intestinal canal, the distilled water being added to increase the bulk and remove the objectionable taste of the hydrogen. Of 26 cases thus treated, 23 recovered. The author describes an apparatus invented by him better to carry out his plan. This consists of a reservoir containing the irrigating solution, placed on a shelf about three feet above the level of a special table, arranged in the centre for carrying off the fluid as it flows from the bowels. The solution is carried from the reservoir to the patient by a long rubber tube, to which are attached two stop-cocks for controlling the flow.

Interesting in this connection are the experiments of Judson Daland, of Philadelphia,^{5 July} carried out with the view of determining the competency of the ileo-caecal valve to prevent absolutely the passage of liquids from the colon into the ileum. Using seven bodies of children, a fountain-syringe containing 3 pints ($1\frac{1}{2}$ litres) was suspended at an elevation of five feet, and a rectal tube introduced for a distance of six to seven inches. In two cases the valve was competent to prevent irrigation of the small intestine; and in one case, owing to a peculiar twist in the ileum, and the pressure of the overdistended colon, liquids failed to enter the ileum. This case is particularly instructive, and shows that in a certain number of cases success may be looked for, even though the first attempt

prove a failure. In four cases there was no difficulty whatever in the passage of liquids from the anus to the stomach, or even out through the mouth and nose. In addition to these facts, several patients seen by him at the Swinburne Island Cholera Hospital, to whom injections of tannic acid had been given, vomited tannic acid, thus proving that the solution had passed through the ileo-cæcal orifice. This observation was made by Cantani some years ago.

Polubinski ⁵⁸⁶_{No. 50, 72; Apr.} ⁶⁷³ has observed in choleraic patients real benefit from the use of tar-water, which he gave internally, in small quantities, and in the form of enemata. It generally arrested violent diarrhoea and vomiting, and improved the *bien-être* of the patients. (Report of Corr. Editor Drzewiecki, Warsaw.)

Cantani, of Naples, ⁴_{No. 55, 74; Feb.} ¹¹² considers that there are four indications to be met in this disease: (1) the prevention of the growth of the comma bacillus in the intestinal canal; (2) the neutralization of the cholera poison in the intestinal canal; (3) the most rapid excretion of the poison absorbed by the blood; (4) the correction of the thickening of the blood which may have already taken place in the cholera patient.

Naturally the indications change with the various stages of the disease. The first two can only be met in the very early stages, while the last two can have reference only to the later stages, or in very severe attacks. Practically, we meet with three stages of the disease,—the premonitory diarrhoea, the well-developed attack of cholera, and the stage of reaction. In the first stage the first two indications must be met promptly and efficiently. The treatment found by the author to be far superior to all others in preventing the growth of the comma bacillus in the intestine, and in counteracting the poison developed there, is the use of hot enemata of tannic acid. Five to 20 grains (0.32 to 1.3 grammes) of tannic acid are dissolved in from 1 to 2 quarts (litres) of hot water at 101° to 103° F. (38.3° to 39.5° C.). To this are added 30 to 40 drops of laudanum and 50 grains (3.20 grammes) of gum arabic. In this stage he gives no medicine internally, but little to drink, though the patient may have a small quantity of cold water and a little red-wine or champagne. He may also have lactic-acid or hydrochloric-acid lemonade, or ordinary lemonade with cognac. The earlier the treatment is begun, the more beneficial the results.

The indications in the second stage of the disease present counteractions and excretion of the poison in the blood, and a prevention or correction of the thickening of the blood is best met by the subcutaneous or intra-venous injection of salt solutions. The third or reactionary stage is also best treated, after all diarrhoea and vomiting have stopped, by the administration of water, wine, and cognac in small quantities, frequently repeated, but he believes the conditions will be greatly helped by continuing the subcutaneous and intestinal injections of water, either acid or a salt solution. Dubner, of Simbirsk, ⁵⁸⁶_{No.34, p.2; Jan.14}, treats cholera mainly by Cantani's tannin enemata, repeating the injections four or six times. He begins with a solution at from 38° to 40° C. (100.4° to 104° F.), but as soon as improvement sets in he reduces the temperature down to 32° or even 28° C. (90 or 84° F.), because frequent hot injections are apt to give rise to abdominal pain and general weakness. Hot enemata are also contra-indicated by bloody stools. If restlessness or excitement is present, the author orders a warm bath with irrigations of the head. He systematically avoids any internal medication (including calomel, which occasionally causes intestinal haemorrhage and cystitis). Narcotics he thinks worse than useless, since they are apt to inhibit the action of the gastric mucous membrane, and may even induce hiccup. Stimulants (camphor, musk, etc.) proved useless in his hands.

Argentoff ²⁰⁵¹_{No.21, p.45; Nov.1} ²⁶ advocates high enemata of a 0.5-per-cent. solution of hydrochloric acid, administered alternately with similarly large and high injections of a 1-per-cent. solution of tannin. Shiloff, of St. Petersburg, ²⁰⁵¹_{No.65, p.59; Nov.1} ²⁶ recommends high rectal injections of an acidulated solution of peroxide of hydrogen. He calls attention to the well-known, but frequently undervalued, fact that a prolonged contact of water with turpentine transforms the former into a fairly-strong solution of peroxide of hydrogen.

For the vomiting, Dübelir, of Moscow, ⁵⁸⁶_{No.42} states that a hot, strong, black-coffee infusion administered internally, 2 or 3 tumblersfuls daily, exercises a most decided beneficial action on cholera patients. Even in very severe cases vomiting ceases, the patient's consciousness brightens, the pulse becomes stronger, and the secretion of urine increases. The writer emphatically suggests a fair trial of this simple remedy.

Lazaraff and A. Przedborski ⁵⁸⁹_{No.34, p.2; Feb.11} speak highly of cocaine

as a means of inhibiting vomiting. In cases of moderate severity they obtained fairly good results from calomel with salol as intestinal disinfectants. They begin with 8-grain (0.52 grammie) doses of the former drug and 10-grain (0.65 grammie) doses of the latter, and repeat the powder in an hour; subsequently they give from $\frac{1}{2}$ to 2 grains (0.03 to 0.13 grammie) of calomel with 10 grains (0.65 grammie) of salol every two hours for one or two days. Calomel, in large doses (0.5 grammie— $7\frac{1}{2}$ grains), was found very effective in some cases by Skvortzoff ⁵⁸⁶_{No. 19, Feb. 11} and Vasilieff. ²⁰⁵¹_{No. 26, p. 29, Nov. 1}

Blagovidoff ⁵⁸⁶_{No. 24, 32, Feb. 11} has tried blisters to the neck, along the course of the vagus, in cholera, with the result that both vomiting and hiccough ceased. D. Tzitrin ⁵⁸⁶_{No. 34, 32} resorted to painting the region with cantharidin collodion in four cases; the vomiting was stopped, but the hiccough was aggravated. Odartchenko ⁵⁸⁶_{No. 14, 32} recommends nitrate of silver, $\frac{1}{15}$ - to $\frac{1}{8}$ - grain (0.004 to 0.008 grammie) doses, a couple of which usually suffice.

Popoff, ²⁰⁵¹_{No. 26, p. 55; Nov. 1} ²⁶ in cases of cholera coming under his observation shortly after the development of first symptoms, found that a subcutaneous injection of camphor, with musk, is rapidly followed by a striking amelioration in the patient's condition, vomiting either greatly decreasing or ceasing altogether, the well-known distressing oppression about the chest similarly subsiding.

For the algid stage, ammonia internally and ether hypodermatically, besides the free administration of alcohol, are highly recommended by Giachich, ⁴_{Sept. 5, 32} the aim being to support the failing heart. Marked improvement in the general condition was noted within two hours after the institution of this mode of treatment, and over 50 per cent. of those who had reached the algid stage were saved. Dumontpallier ¹¹_{Oct. 19, 32} recommends for the same purpose the hydrochlorate of ammonia. Besides the return of heat and perspiration caused by this salt it increases diuresis, and therefore increases the elimination of the toxic elements of the disease. Atropine showed marked evidence of value in a case treated by Lauder Brunton. ²_{Jan.} The father of a child died very shortly after admission into the hospital. The child also collapsed and appeared likely to die, but a subcutaneous injection of atropine revived her for a time. This was followed by a relapse, but another injection was administered, with good results, and the child recovered. Never, in either the child's case or her father's, did the stools

present an appearance of rice-water, but cholera bacilli were found by Klein in the intestine of the father. Illingworth ²²_{June 19} recalled that he advocated the use of belladonna nine years ago. ²_{Dec. 13, '84} Centre, of Jacksonville, ¹⁷⁶_{Dec. 22} also used this drug, in the form of sulphate of atropine, dissolved on the tongue of the patient with a little warm water, and repeated every two hours. Scriven ²_{June} thinks that in some cases atropine, injected hypodermatically, might be most useful on account of the control that it would exercise over the cramps of the muscles and in spasm of the bile-duct.

Witkowski ¹¹³_{No. 41; Dec.} ⁸¹⁴ ascribes the greatest importance to ichthylol, especially in the typhoid stage of cholera; the remedy does not only exert a good influence upon the entire process of repair in the intestinal tract, but also influences the kidneys favorably. He says that he saw no patient die who had passed the algid stage and who was treated with ichthylol in the typhoid stage. The internal use of this medicament is said to be perfectly free from ill effects. As to diet, we must see to it, as soon as vomiting has abated, that the patients' stomachs are never empty, but that they ingest some coffee with milk, oatmeal-gruel, or milk. The presence of solid food in the intestine is not injurious, provided it be aseptic and non-irritant; it offers, at the same time, the vehicle for the medicaments. An exclusively liquid diet is only allowed in convalescence, and should then be continued.

Sokoloff ⁸⁵⁰_{Nos. 1, 2; Mar.} ²⁶ comes to the following conclusions, based upon the treatment of 944 cases with a mortality of only 20.7 per cent.: 1. In mild or incipient cases of the affection a local treatment of the diseased gastro-intestinal tract should be resorted to, side by side with the improving of the patient's general condition. Good service may be expected from (*a*) the internal administration of Botkin's anti-cholera drops, their formula being this: R_y Tincturæ quiniae compositæ, spiritus anodynæ Hoffmanni, àā 15 grammes (3½ drachms); quiniae hydrochlorici, 4 grammes (1 drachm); acidi hydrochlorici diluti, 2 grammes (½ drachm); tincturæ opii simplicis (*Ph. Ross.*), 4 grammes (1 drachm); olei menthae piperitæ, gtt. x. M. Sig.: Give from 15 to 20 drops every two hours. (*b*) Cantani's high enemata with tannic acid (which not infrequently control vomiting and diarrhœa); (*c*) internal use of salol with subnitrate of bismuth; (*d*) calomel in small doses. 2. In severe cases (in primary collapse, or in uræmic condition) the measures

should be mainly directed to stimulating and sustaining the cardiac and cutaneous action. The best means for the purpose are afforded by repeated and prolonged general hot baths, heating the patient's body by any available means, a free administration of wine, hot tea or coffee with brandy, and subcutaneous injections of camphor. High tannin enemata here prove powerless to make any impression on collapse, though occasionally they may somewhat improve the patient's subjective state, or arrest diarrhoea and vomiting. As to subcutaneous transfusions of saline solutions, they are utterly useless, and should be discarded from the therapy of Asiatic cholera, since they inflict "a totally wanton torture on an already severely-ill patient."

Duke,⁶ surgeon of the Bengal army, highly recommends the subcutaneous use of strychnine and pilocarpine, advocated by Ffrench-Mullen last year (see ANNUAL for 1893, vol. i, D-22). His way of carrying out the treatment is as follows, each case requiring modifications or additions according to its needs: A pill consisting of 2 grains (0.13 gramme) of calomel and $\frac{1}{2}$ grain (0.03 gramme) of extract of cannabis Indica is administered, and this repeated every second hour for three doses. If the pill is vomited, pure calomel is placed on the tongue. In the case of adults, 5 minims (0.32 gramme) of liquor strychnia (P. B.) with 5 minims (0.32 gramme) of water are then injected into each arm. After from four to six hours 5 minims are again injected, the total amount given in twenty-four hours reaching 20 minims (1.3 grammes) or 25 minims (1.6 grammes). The success of the remedy is known by the return of the pulse—frequently in twelve hours—and by the voice. During the next twenty-four hours from 10 to 15 minims (0.65 to 1 gramme) are generally used, and again during the third twenty-four hours. To promote urinary secretion—say, after from eighteen to twenty-four hours or more— $\frac{1}{8}$ grain (0.008 gramme) of pilocarpine is subcutaneously injected, the action being marvelous and rapid. To check hiccough, nausea, and sickness 5 grains (0.32 gramme) of antipyrin (one or two doses) act wonderfully. Mustard plasters are sometimes used to the stomach and the limbs. Fluids are freely allowed, as also good, plain soup.

Gaillard, of the Cholera Hospital at Havre,¹⁵¹ states that whenever a patient was admitted in the algid stage his body was

at once vigorously rubbed, repeated hypodermatic injections of caffeine and ether were given, as also inhalations of oxygen. If no benefit accrued, 2 litres (2 quarts), for an adult, of the following saline solution were injected into the internal saphenous vein: sterilized distilled water, 1000 grammes (1 quart); chloride of sodium, 5 grammes ($1\frac{1}{2}$ drachms); sulphate of sodium, 10 grammes ($2\frac{1}{2}$ drachms). This generally suffices to revive the patient. Sometimes, however, the transfusion has had to be repeated (once five times), but an interval of at least eleven hours is allowed to elapse between the injections. When the patient is able to swallow he is given a litre (quart) of sweetened water containing 15 grammes ($3\frac{3}{4}$ drachms) of lactic acid. This is followed by champagne, coffee, and nutrient enemata. Dr. Gaillard's results stand thus: Cures, 173; deaths, 164; under treatment, 23,—total, 360. Of the cases cured, 25 owe their lives to transfusion of sterilized serum. One operation generally sufficed; in 3 cases only was the transfusion repeated once. Fifty-two very serious cases were saved by the lactic-acid treatment only, without transfusion. At the height of the epidemic there were as many as sixty-two male nurses in the hospital; of these, only one contracted the disease, and he was saved by transfusion.

Rumpf² has published his experience of the most usual methods employed in about three thousand cases during the present epidemic. His experience of drugs has been very unfavorable. Of the various preparations, salol, cresoline, creasote, muriatic acid, lactic acid, cresol, chlorine water, sulphuric acid, and morphine, not one, he says, was of any avail. Tannin elysters, as recommended by Cantani, did good in the less severe cases, and after the crisis was over. The best results were obtained by doses of calomel. Warm baths and subcutaneous injections of solutions of common salt and of camphor and morphine have proved the next best remedies. Dr. Rumpf concludes that there is no specific remedy for cholera yet known.

DIARRHOEA.

The influence of a defective water-supply as a cause of diarrhoea is interestingly shown in an article by J. G. Porteous, of Poughkeepsie, N. Y.,⁴⁰ who describes an annual epidemic of diarrhoea which both the medical profession and the laity are accus-

tomed to call "winter cholera," usually beginning in December and lasting into March with varying intensity; much more severe in cold weather, but even prevailing to a moderate extent in a warm winter. It usually begins with a slight nausea, at times accompanied by chilly sensations; more or less pain in head, back, and extremities; thin, grayish discharge from the bowels, occurring quite frequently, and which, if unchecked, becomes of a flaky appearance and is not infrequently tinged with blood. There is considerable pain in the bowels just before and during an evacuation; slight tenderness over the abdomen, not confined to any one locality; and at times tympanites. There usually is considerable thirst and a slight rise in temperature, not often more than to 101° or 102° F. (38.3° to 38.9° C.). The tongue is coated with a white or yellowish fur, the pulse is rather small and rapid, and there is almost entire loss of appetite. When uncomplicated the disease ends in recovery, but it is often tedious and subject to frequent returns. Non-residents are, as a rule, particularly susceptible to it. It is generally readily checked by small doses of mercurial chalk and some opiate. Astringents do not seem to control it.

The water supplied to Poughkeepsie is taken from the Hudson River, 28,000 feet above the outlet of the city sewers and 18,000 feet below the outlet of the sewer from the Hudson River State Hospital for the Insane. The city has about 23,000 inhabitants and a number of factories; the insane asylum has over 500 inmates. The pumping-station for the water-works is on the same side of the river as the city and asylum, and, being between their sewers, whichever way the tide is running, sewage is likely to be carried to the intake-pipe. The water is taken from under and about four feet inside the face of the dock used to land coal, and is pumped into the filter-beds, where it is filtered through two feet of sand, eighteen inches of gravel, and two and a half feet of broken stones. In the summer-time this process, aided by the vegetable growths in the river and the action of the sun and air, appears to purify the water sufficiently to prevent disease; but, as soon as ice forms in the river and filter-beds, winter cholera begins.

Still more clearly defined is an outbreak of diarrhoea which took place in Melbourne in November, and described by D. A. Gresswell. ²⁸⁵ Mar. 16 The outbreak presented the remarkable feature of being limited to one block or square of houses, the water-pipes of

which had been closed off temporarily for purposes of repair, and opened again without any attempt having been made to wash out any foul matter that might have entered them through fire-plugs, leaks, or improperly-situated service-pipes. Of the tenants who boiled the water before using it, but 1.8 per cent. were affected, while 50 per cent. of those who used the water unboiled became sufferers. Besides the severe diarrhoea, the patients experienced sharp abdominal pain; there was also vomiting, and blood was passed at stool.

A. P. Das, of Chaudney Hospital, India, ¹⁰⁵⁵_{June 1} describes, under the name "chronic tropical diarrhoea," an affection that is very prevalent in India. Malaria and disturbances of the abdominal viscera, including the liver, stomach, and the chylopoietic system, appear to act as predisposing causes. Exposure to sudden climatic perturbations, damp, cold, bad food, and impure water, emanations from decomposing animal and vegetable matter, and excessive exercise then become as many pathogenic elements of the affection. Impaired gastric and intestinal digestion, consequent upon deficient secretion of gastric juice, bile, and pancreatic secretion, is soon followed by deterioration of the intestinal lining. The shedding of the epithelium and of the villi is profuse, giving rise at times to denudation of the intestine and to spots of ulceration. The usual concomitant symptoms of chronic diarrhoea are present, the motions being clay-colored or white, and offensive and very frequent. The pain incident upon the intestinal action disappears in the later stages of the disease, which are characterized by intense anaemia, intense thirst, scanty urination, etc. The temperature may be normal or subnormal, with a slight rise during the night. The prognosis depends upon the complications. As regards treatment, Das recommends the pulp of the bael (*Aegle marmelos*) 1 ounce (31 grammes) night and morning. If the fresh fruit cannot be procured, a teaspoonful of the fluid extract or of the powder may be substituted. Milk diet—fresh milk boiled—is imperative. For the liver, $\frac{1}{2}$ to $\frac{1}{6}$ grain (0.008 to 0.01 gramme) of calomel is recommended. To lessen excessive peristaltic action he prefers opium, rest being, of course, insisted upon.

Under the name of "intractable white diarrhoea," generally known as "sprue," Duncan J. Reid, of Shanghai, China, ²³⁵_{Mar.} describes an affection which presents much analogy with the above

(probably the same disease), and which generally shows itself in foreigners who have been in China for some years,—a fact which greatly supports the opinion of the author that malaria enters into its causation. Considerable importance is also attached to the effects of gastric disorders and of imperfect action of the liver. Reid objects to milk, and advocates predigested or easily-digested food. For the hepatic atony he advises salicylate of soda and ipecac, the former being replaced by bicarbonate of soda after a few days. Change of air is highly recommended during convalescence.

D. P. Nikolski ⁵⁸⁶_{Na. 49, 192}, ⁶⁷³_{Apr.} made observations upon the value of *vaccinium myrtillus*, well known amongst the Russian and Polish people as a remedy against diarrhoea. In the treatment of gastro-enteric disorders by it it is best to administer the decoction, prepared from the dried berries ($\frac{1}{4}$ to $\frac{1}{2}$ pound— $\frac{1}{8}$ to $\frac{1}{4}$ kilogramme—of berries to 1 to 2 pounds— $\frac{1}{2}$ to 1 kilogramme—of water boiled down to two-thirds of the original quantity). According to the age of the patient and violence of the disease, from 2 to 3 glasses are given daily. In all cases of catarrh of the intestines (more frequently acute) observed by the author, the decoction gave positive results, and the diarrhoea, after two, three, or, latest, five days, was entirely arrested; the stools became infrequent and thicker; tenesmus, pain, and flatulence soon disappeared; the tongue became clean, appetite better, and the patients felt quite well. Hence this remedy appears to be an excellent means against diarrhoea; the more so, it can be said, that when the author treated diarrhoea by bismuth, naphthalin, salicylate of soda, codeine, castor-oil emulsion, etc., it was not only not arrested, but lasted longer. The active substances in these berries appear to be principally tannic acid and a pigment. Other authors have ascribed some influence to the quinine, acid, resin, and other substances which are present in *vaccinium*, but these are only suppositions. Perhaps *vaccinium* may deserve a prominent place among therapeutic remedies. (Report of Corr. Editor Drzewiecki, Warsaw.)

Dermatol is very highly recommended by Colasanti and Dutto, ⁴⁸⁴_{T. 12, No. 5, 192}, ¹¹²_{June} not only for simple diarrhoea, but also in that accompanying phthisis, typhoid fever, malaria, and ulcerative enterocolitis, in doses of $7\frac{1}{2}$ grains (0.5 gramme) four times a day, increased in severe cases. Trapeznikoff, of Dvinsk ⁵⁷¹_{May 22; Aug.} ¹⁰⁹ highly eulogizes knotgrass or centinode (*Polygonum aviculare*, "Bird's

buckwheat"). The remedy should be administered in the form of a decoction made of 1 ounce (31 grammes) of the herb to 4 ounces (125 grammes) of distilled water, a tablespoonful being given eight times a day. Bradford, of Philadelphia,^{71 Nov., '92} extols minute doses of arsenite of copper (gr. $\frac{1}{32}$ to 0.00002 gramme), permitted to slowly dissolve in the mouth every hour. Chloroform-water, 200 grammes (7 ounces), daily is recommended by Le Dantec.^{996 Jan. 25} Bourget^{211 July 15} obtained remarkable results with salacetol, a combination of salicylic acid and acetol. The salt passes the stomach without having been decomposed, but subdivides into its primary constituents in the intestines, the salicylic acid being then free to exert its antiseptic action, while the acetol is rapidly eliminated in the form of acetone. The best method of administering it is to dissolve 2 to 3 grammes (31 to 46 grains) in 30 grammes (1 ounce) of castor-oil, and give it before a meal. A second dose is seldom necessary in the ordinary form of diarrhoea. Children bear the remedy very well.

DYSENTERY.

This subject has attracted considerable attention during the past year. A most interesting review of our present knowledge of the etiology and pathology of the disease was published^{830 Sept., Oct., '92; June 112} by Wesener. This author distinguishes three forms of dysentery, viz., the mechanical, the toxic, and the parasitic. Under the first form he groups all the intestinal inflammations which are directly produced by the irritant contents of the intestine. Formerly, a large proportion of cases were assigned to this class, but of late mechanical causes have come to be considered more as accessory than actual primary causes. Toxic dysentery has also lost considerable ground. It is certain that some irritant chemical substances can produce intestinal ulceration, but just how far this cause acts in the production of actual dysentery is disputed. It cannot even yet be determined whether irritant chemical substances can produce dysentery in man or not, in the clinical sense of the term, as we understand it in the case of sporadic tropical dysentery. Probably the presence of irritating chemical substances constitutes a predisposing cause of the disease, by rendering the intestinal tract susceptible to the microbial invasion. They certainly can give rise to the formation of intestinal ulcers.

Parasitic dysentery receives especial attention and is studied under two separate headings: (*a*) when the disease is brought on by bacteria, and (*b*) when it is caused by amœbæ. As far back as 1869, Basch showed the presence of micro-organisms in the mucous and submucous membranes of the intestines of persons who had died of dysentery, although he could not make out their exact shape. In 1888 Chantemesse and Widal presented a communication to the Academy of Medicine of Paris, setting forth the result of their observations on the bodies of several victims of dysentery, who had contracted the disease either in Tonquin, Cayenne, or Senegal. They found a special bacillus, rounded at its extremities and with a slightly greater thickness at the middle, which was colored by aniline dyes and did not liquefy gelatin. Injected into animals through the mouth, it gave rise to intestinal ulcerations, in which the self-same bacillus was found. The most recent article on the subject is that of Ogata (see ANNUAL for 1893, vol. i, page D-27), who made a thorough study of the different forms of dysentery existing in Japan.

Loesch, of St. Petersburg, was the first (1875) to call attention to the presence of amœbæ in dysentery. He had noticed a considerable number of them in the stools of a patient suffering from profuse diarrhoea, and at the autopsy discovered in the intestines ulcerations and old cicatrices due, probably, to a former attack of dysentery. Injected into a dog through the mouth and rectum, these amœbæ reproduced themselves in considerable masses, and caused intestinal ulcerations. Cunningham, however, asserts that he has found free and encapsulated amœbæ in healthy persons, as also in the intestines of horses and cows. He does not, therefore, consider them pathogenic. Koch found amoeboid corpuscles, from one and a half to two times the size of leucocytes, four times in five cases of dysentery in Egypt; the cases in which they were absent being already on the road to recovery. Immediately after the publication of this news, Kartulis, of Alexandria, recognized, in the faecal discharge of dysenteric patients, the same amoeboid elements described by Loesch. He injected them into several animals unsuccessfully, and tried to obtain cultures with them, also without success. He found amœbæ likewise in the hepatic abscesses of patients suffering from dysentery. Hlava, after fruitlessly searching for microbes, detected the amœbæ in sixty consecutive cases of dysen-

tery. In 1878, Grassi ascertained that the amœba coli exerts no pathogenic action whatever, and that it exists in healthy persons in all Italy and the southern part of France; he found it in widely-different diseases, such as typhus, cholera, pellagra, colitis, as a consequence of a tumor, in diarrhoea *ab ingestis*, etc. Dock also does not attribute to amœbæ any pathogenic action. Councilman and Laffleur found the amœba coli in the faeces, the hepatic abscess, etc., in fourteen out of fifteen cases of tropical dysentery, and their description of this wandering cell agrees with that of Kartulis. Their conclusion is that the amœba coli is the true cause of the dysentery of tropical countries.

As a result of this review of the subject, Wesener concludes that the endemic dysentery of warm climates is probably generated by animal parasites, is not contagious, and is sometimes also found in temperate regions. The amœba seems to be the principal factor in its causation, and the pathological changes produced are most likely due, in part at least, to the bacteria developed *in situ* or transported there by the wandering amœbæ. The direct pathogenic action of these corpuscles has not yet been satisfactorily established.

In sporadic dysentery we cannot therefore completely cast aside the mechanical causes in the etiology of the disease, as, for instance, compression due to an impaction of faecal or toxic matter in the intestines. The schizomycetes co-operate with the pathological process by swarming into the already-altered tissue. What the species of those micro-organisms is we do not know, but they are certainly not the same which produce epidemic dysentery.

In a recent paper Kartulis, of Alexandria, ^{June 18} took exception to the statement made by Zancarol, at the last Surgical Congress, in a paper upon the pathogenesis of hepatic abscess, in which the latter observer denied the importance of amœbæ in the etiology of dysentery, and ascribed to the streptococci alone the pathogenic rôle. Kartulis insisted upon the importance of amœbæ, especially in the causation of dysenteric abscesses. Whether they alone cause them or require the assistance of other organisms is not yet known.

Pasquale ⁵³¹ also observed that a great number of micro-organisms accompanied the amœbæ, but he found that these organisms were not always present, and that those that were

present did not always correspond with those observed at other times. He, nevertheless, ascribes the genesis of dysenteric hepatic abscesses to the associated action of amœbæ and bacteria. He believes with Kartulis that, while amœbæ may be found in this variety of abscess, they cannot be found in idiopathic abscess.

A good *résumé* of the question is furnished by Schuberg.⁵⁰ May 4, 17, 29 This author considers any positive conclusion as premature, although he is inclined to accept the *amœba coli* as the *probable* cause of dysentery. As to the manner in which the parasite enters our organism, our limited knowledge concerning the organism itself limits our field of inquiry. Again, so many factors enter into the genesis of an epidemic that it is very difficult indeed to positively establish and isolate any given factor. The most elementary principles of hygiene, however, make the use of pure water of capital importance at all times, and especially during epidemics of diseases attacking the intestinal canal. While impure water may be the habitat of the parasite, it may independently act as a predisposing cause.

Kovács,⁸ Dec. 8, '92; Dec. 31, '94 in a lengthy paper, sustains the confirmatory testimony and describes several cases of amœbic dysentery. The affection usually commences with nausea, retching, and vomiting, accompanied by diarrhoea and tenesmus. Its duration varies from several weeks to many years. The amœbæ are spherical, contain a nucleus, and have two sheaths,—the outer homogeneous, the inner granular. The movement which characterizes them is produced by folds on the lower surface, and not by projections from the sides. When a preparation of them is allowed to stand for some time, vacuoles form; sometimes they contain red blood-corpuscles or blood-pigment. In the formation of an hepatic abscess the amœbæ are just observed around the central vein. The contents of the abscess are brownish at first, becoming chocolate in color as age advances; the walls become necrotic and may ultimately form a capsule. He was not yet convinced that this micro-organism was the primary cause of the dysentery, as no infiltration of the submucosa, necrosis in the ulceration, or gangrene were present. His experiments on animals were positive in producing dysentery and enteritis when introduced in the form of a cyste.

Kruse⁶⁹ Ns. 15, 16 states that the amœbæ can be found in large quan-

ties in the intestinal glands. In a case reported by Musser and De Forrest Willard, of Philadelphia,¹¹² the association of symptoms clearly demonstrated the existence of amœbic dysentery with hepatic abscess. Upon opening the latter a pint of the typical chocolate-colored pus was evacuated. J. W. Brannan, of New York,¹ describes a case occurring in the practice of Edebohls, in which, during a period of about six years, five different hepatic abscesses, the result of amœbic dysentery, were diagnosed and successfully operated upon, the patient finally succumbing to a sixth abscess, which opened spontaneously and led to death by exhaustion. Post-mortem pathological investigation determined the presence of the amœba coli in both the large intestine and the liver.

Two features of special interest deserve particular attention. The first was the intense and terrible shock on each of the three occasions when the hepatic tissue was cut through without the employment of a general anaesthetic. While the incision through the abdominal walls left the patient unmoved, there was immediate and total collapse when the liver was incised. The pulse became small, on one occasion imperceptible; profuse, clammy perspiration suddenly broke out; respiration was suspended; and during one operation Edebohls feared his patient had died under the knife. In a fairly large surgical practice he had never seen anything so profound in the way of shock and collapse. The second point of interest was the total disappearance, after three years, of the firm peritoneal adhesions through which the first two abscesses had been opened and drained. Of interest pathologically is the fact that, notwithstanding the local destructive process extending over a period of many years, the size of the liver had remained normal. This was found to be mainly due to the connective-tissue growth extending at several points from the surface of the liver deeply into its substance. This connective tissue evidently represented the cicatrices left by the various abscess-cavities. The cicatricial tissue was so abundant that it of itself would go far toward replacing the liver-tissue destroyed. In other parts of the liver, far removed from the seat of the abscesses, there was also an extensive formation of connective tissue. This newly-formed tissue not only followed Glisson's capsule between the lobules, but extended into the lobules between the liver-cells. In other words, there was chronic

interstitial hepatitis, both intra-lobular and inter-lobular. But this new formation of connective tissue was not the only process present to explain the size of the liver. Throughout the greater part of the organ the capillaries were large and rather irregular and distended with blood, and contained cells of various sizes and shapes. These cells were apparently either normal or proliferated endothelium. The liver-cells in the region of the dilated capillaries were somewhat distorted, but otherwise not much changed. In no part of the liver was there noted the peculiar arrangement of the lobules described by Ponfick. The regular distribution of the capillaries was maintained, and the cells did not vary materially from the normal type in either size or shape. While it is evident, from the experiments of Ponfick and others, that more or less extensive losses of parenchymatous tissue may be made good by a reproduction of specialized cells, this case seems to indicate that the repair of such losses in an organ restored to its original size can be largely accounted for by a wide-spread dilatation of the thin-walled blood-vessels.

Treatment.—West, of Galveston,⁵⁹ described seven cases of amœbic dysentery in which the symptoms were quite uniform. Although they began acutely, they soon became chronic, and were characterized by irregularity in the flux, as to character and frequency of the stools, alternating between improvement and relapse. The nature of the disease being such as to produce very rapid anaemia and wasting, it is necessary to combat these results by the plentiful use of nitrogenous food,—meat, fowls, eggs, rich broths, milk, etc.; if restricted to a milk diet, these patients will very rapidly fail. He advocates thorough irrigation of the intestine (1) with simple warm water for cleansing purposes, and (2) with an antiseptic solution for destroying the organisms and stimulating the ulcers. For this purpose he tried solutions of quinine, creolin, and silver nitrate, the latter giving the best results; quinine, in his experience, failing to accomplish any permanent good. Large doses of bismuth subnitrate and salol had a distinct effect in controlling the excessive frequency of the stools. Salines were at times beneficial. Nitrate of silver is also recommended in acute dysentery by Nilkanthrai Dayabhai, of Ahmedabad, India,²³⁹ complete cure having been obtained in six days. The rectum is first washed out with tepid water, and one hour later 5 ounces (155

grammes) of a 2 grain (0.13 grammes) to the ounce (31 grammes) solution of the silver salt is injected.

In refractory cases Glinsky⁵⁸⁶_{No. 41, 12} secured a favorable result by rectal injections of naphthalin in emulsion,—2 to 4 grammes ($\frac{1}{2}$ to 1 fluidrachm) of naphthalin suspended in 400 to 600 grammes (12 $\frac{1}{4}$ to 19 fluidounces) of an oleaginous mixture. He failed to obtain benefit from ipecacuanha, lauded by A. H. Hart, of Suez,⁶_{Oct. 1, 1922} and by Crombie.²⁰⁶_{No. 4; Aug.} The former considered the effects of the drug in large doses as magical, owing to its sedative influence upon the exalted peristalsis characterizing the disease. A large dose arrests the tenesmus suddenly, while smaller subsequent doses prevent its return. Crombie, though praising ipecac, considers it inferior to bismuth and Dover's powder, so generally employed. Daland, of Philadelphia,¹⁰⁴_{Nov. 19, 1922} reports the treatment resorted to in Nicaragua,—a country in which dysentery, especially the malarial form, is extremely prevalent. The treatment found most effective, and recommended by Bermudez, of Managua, is, to an adult, 6 grains (0.39 grammes) of quinine morning and evening, in conjunction with: Rx Ammonium chloride, 5 grains (0.32 grammes); pulv. ipecac, 5 grains (0.32 grammes); tr. opii, 10 to 15 drops; to be repeated every two hours. The amount of laudanum is determined by the severity of the pain. When the pain is particularly severe and obstinate, morphine is superadded; and, in cases marked by debility, it is customary to substitute the carbonate for the chloride of ammonium, in 5-grain (0.32 grammes) doses every two hours, day and night. In the way of food, nothing is permitted except milk, or milk and lime-water, to which sago may be added. The patient is allowed to drink freely of cool water, thus alleviating the intense thirst which is usually present. Ice-water is considered harmful. While, as Daland states, the greatest confidence is placed in the use of chloride of ammonium, it is also well to note that ipecacuanha enters into the composition of the formula. The beneficial effect of this agent in this latitude corresponding with that of Suez in which Hart obtained his satisfactory results, it may be safely deducted that ipecacuanha is a valuable drug in the forms of dysentery observed in warm countries and due to the amoeba coli. As noted by Daland, this organism has not been searched for by Nicaraguan physicians.

Salol is recommended by Rasch,⁶⁹_{No. 17} Banerjee, of Pachbadra,_{Feb.}

and Agia Ram, of Murree.²³⁹ The latter author claims to have had very considerable experience with the drug, and characterizes it as the specific for dysentery. He gives the drug in the following combination, which acts both as a purgative and a curative medicine: Rx Salol, 30 grains (2 grammes); olei ricini, 3 drachms (12 grammes); sodii bicarb., 40 grains (2.60 grammes); mucilag. acacie, 1 ounce (31 grammes); aq. chloroformi, ad 8 ounces (248 grammes); 1 ounce (31 grammes) to be given every three hours. The taste of castor-oil may be removed by a drop of oil of cinnamon or of eucalyptus. Nabee Buksh, of Neemuch,²³⁹ suggests that the oil has quite as much to do with the cure as the salol. Herring, of Highland Station, Kan.,⁵⁶⁸ _{Oct., '92} highly recommends small doses of sulphate of magnesium every two hours, with milk and fruit diet.

Liebersohn⁵⁸⁶ _{No. 28, '92} recommends hot enemata of tannic acid and boric acid every three hours, each consisting of 1 pint of a 4-per-cent. solution of boric acid, 10 grains (0.65 gramme) of tannin, and 3½ drops of tincture of opium, the whole to be dissolved in a tumbler and a half of hot boiled water. The injecting fluid is to be retained in the bowel for one or two minutes. Warm-water or "boric-lotion" injections are also recommended by de Silva, of Colombo,¹⁷⁴ _{Apr.} 40 to 60 ounces (1250 to 1875 grammes) being employed for each enema. Three are to be administered during the day.

Yarrow (infusion of the leaves) is recommended by Cline, of Woodstock, Va.,¹⁸⁶ _{Sept.} and chopparro amargoso by Mixon, of Wrightsboro, Tex.⁶⁴⁵ _{Aug.} Schwartz, of Constantinople,⁵⁷ _{Sept., '13} considers as most effective, after extensive experience, a pill composed of myrobalan, pelletierin, extr. graminis, extr. pomegranate, and gum arabic.

CONSTIPATION.

With the exception of general reviews of the subject, most important of which are Currier's¹ _{Feb., '11} and Fleiner's,⁴ _{Jan., '16} nothing has been written upon the etiology and pathology of this disorder. As regards treatment, Dubois, of Berne,²¹⁴ _{No. 10, '11; July} ²²⁹ emphatically recommends an exceedingly simple method, which has been as systematically as successfully practiced by him during the last decennium in constipation of neurotic origin. No medicaments whatever are to be prescribed; but the following instructions should be given

to the patient: 1. A regular rising from bed in the morning at a fixed hour (*e.g.*, 7 o'clock), in order that stimulation of peristalsis induced by awakening should occur always precisely at the same time. 2. Taking a tumblerful of cold water (or a quassia infusion, if the patient, after all, insists to "have some medicine") immediately after getting up (a second stimulation of peristalsis). 3. Taking breakfast (including Graham's bread, and butter) always at the same fixed hour,—*e.g.*, 7.30 A.M. (a third stimulation of peristalsis). 4. Daily making an attempt at defecation at the same hour,—*e.g.*, 8 A.M. (a fourth stimulation of peristalsis). 5. Taking abundant amounts of food, especially of vegetables and fruits, at each meal.

Such anticonstipation code should be given to the patient not only *viva voce*, but on paper as well, and be accompanied by the practitioner's "absolute promise of success."

Ewald, of Berlin,^{July 22} has found caffeine-chloral administered hypodermatically of value. He has made use of injections of 4 or 5 grains dissolved in water, and he has only failed once in thirteen cases of obtaining, as a result, thin stools; in some of these cases the ordinary drugs and free irrigation had been employed without avail.

Ewald has also used the compound in a small number of rheumatic cases that had been resistant to the salicylates. In seven out of eight cases the injection of from 3 to 6 grains in twenty-four hours has been followed by reduction of pain and swelling in the affected joints. These injections are usually not attended by pain, although in a few cases there was a slight burning sensation at the point of the injection. The well-known, but not very uniform, laxative action of caffeine appears to be intensified by the presence of chloral in the compound. If this is a fact, it would seem to be contradictory to certain experiments on the lower animals that have been reported as showing that caffeine, in the presence of chloral, is almost wholly masked. Urea and cyanogen, in like manner, are said to be masked when given with chloral. However it may be as to the overmastering agency of chloral with other substances than caffeine, it seems to be an indisputable fact that caffeine-chloral has a therapeutic future before it in the treatment of chronic constipation.

Vasilieff, of St. Petersburg,<sup>2051 109
No. 31, Aug.</sup> emphatically states that, ac-

cording to his experience, the treatment of habitual constipation by gooseberries, currants, or plums, ingested daily in large quantities, is followed by better results than the administration of any medicaments yet known. The proposition especially holds true with regard to patients belonging to the poorer classes of the community.

H. B. Beatty^{341, 352} recommends the following method for the mechanical treatment of constipation: Two circular pieces of calico about five inches in diameter are sewn together by their edges so as to form a round bag. This is filled to about four-fifths of its capacity with shot ($3\frac{1}{2}$ to 4 pounds), and the mouth of the bag closed. A somewhat globular and very yielding mass is thus formed, which the patient, lying supine, rolls about over his abdomen (preferably following the course of the colon, though this is not of much consequence) before rising in the morning, and if necessary again at night. When needed, the pressure of the bag can be supplemented by that of the hands. Felkin, of Edinburgh,^{36 Aug.} recommends an India-rubber ball, three and a half inches in diameter, almost filled with $5\frac{1}{2}$ pounds of shot. He uses the ball in the treatment of chronic constipation, anaemia, and obesity, and finds it much more convenient than either the celluloid ball or the canvas ball, which are usually employed for the purpose. The ball is to be rolled from right to left round the abdomen for five or ten minutes night and morning. One of his patients had lost ten inches in girth after five months' regular use of it. A rather smaller ball, with a less quantity of shot, he found very useful in inducing a regular action of the bowels in young girls who so frequently suffer from habitual constipation; this plan obviated the need for constant dosing.

Fleischer^{341 Mar. 10} recommends large enemata of oil,— $13\frac{1}{2}$ to 17 ounces (420 to 530 grammes). The quality and chemical preparation of the oils are so varied that care must be taken to make use of as pure and clean an oil as possible. Either pure olive-oil or poppy- or sesame-oil may be used. Impure oil causes the patient great discomfort.

The action of the oil upon the large bowel may be briefly summed up: (1) softening and loosening the faeces; (2) quieting and non-irritating, but, after a longer stay in the bowel, (3) exciting peristalsis and evacuation; (4) preventing absorption. Fleischer

thinks the oil enemata specially valuable for regulating the bowels of anæmic and undernourished individuals.

INTESTINAL OBSTRUCTION.

In a paper describing an interesting case of obstruction in which the constriction was found to be caused by a band extending from Meckel's diverticulum, D. P. Allen, of Cleveland,^{9 Aug. 13, '92} expressed his opinion that more deaths are due to this remnant of the omphalo-mesenteric duct than was formerly supposed. Cases of the same kind are reported by Cazin^{7 No. 13} and F. C. Turner.^{2 Apr. 8} Buchanan, of Glasgow,^{277 July} describes the results of an autopsy in which, on separating the coils of the small intestine, a well-marked diverticulum (Meckel's) was discovered. It lay quite free among the convolutions of the gut, and had not the slightest trace of a mesentery. It projected to the right of the middle line, and had an inclination downward or away from the stomach, so that foreign or other matter could easily have entered its cavity. It was situated on the free border of the ileum, exactly opposite the line of attachment of the mesentery. Its opening of communication with the ileum was very distinct and patent, circular in shape, and without the slightest trace of any valvular arrangement, so that the natural contents of the bowel, foreign matter, intestinal worms, etc., had easy access to the nest which it afforded them. The following are the measurements: Length, 9 centimetres; circumference at base, 11 centimetres; circumference at widest part ($3\frac{1}{2}$ centimetres from base), 12 centimetres; circumference 4 centimetres from apex, 10 centimetres; circumference below apex, 5 centimetres; circumference of apex equals one-half circumference of point of ordinary little finger.

Arnd^{50 V. 13, Nos. 5, 6; May 6} has investigated experimentally the permeability of the wall of strangulated intestine to microbes, in order to decide between the conflicting views of writers, some of whom deny that organisms can pass through a bowel-wall which is not necrosed, whilst others maintain that even when its circulation is in a condition of early stasis the wall is permeable to bacteria. He experimented upon the intestine of rabbits, producing constriction by means of an elastic ring, the compressing force of which had been precisely estimated. Excluding rigidly sources of error, Arnd states that those experiments prove that micro-

organisms (for example, bacillus pyocyaneus, bacillus prodigiosus) introduced into the bowel of the rabbit pass through its wall as soon as blood-stasis has been induced in the latter.

Vierhuff²¹ describes a case of intussusception in an adult who had been attacked, four days previously, by purpura haemorrhagica. Blood was said to have been passed with the stools, and when first seen all the typical symptoms of invagination of a portion of intestine were present. Treatment failed to reduce the intussusception, but the patient recovered after passing the affected portion of the bowel, which had separated in course of time. The author believes he has found in purpura haemorrhagica a new cause of this intestinal affection. In a case of ileo-caecal intussusception, seen by D. J. Caddy,⁶ the temperature went down to 96° F. (35.6° C.).

Pollak¹¹³ Jan. 29; June¹⁴⁷ reports seven cases of acute intestinal obstruction in which stomach-washing was employed, as recommended by Kussmaul, in 1882. Five cases were cured, the others dying of an intercurrent disease, notwithstanding that intestinal passage was made free. Stomach-washing is indicated as follows: 1. In occlusions provoked by coprostasis, faecal and biliary calculi, ingested foreign bodies, twists and knots of the intestines. It is also employed in all cases where the localization of the site of the obstruction is impossible. 2. As a palliative measure in all cases where, in consequence of weakness of the patient, an operation is contraindicated. 3. Before all operative procedures in order to reduce the intra-abdominal pressure. Washing of the stomach must be continued for at least two and not longer than four days, and repeated daily from two to four times. If, at the end of this time, the intestinal lumen is still impermeable, an operation is at once indicated.

As adjuncts to stomach-washing, high intestinal irrigations and opium *per orem* may be mentioned. Water is used for stomach-irrigation and must be continued each time until the return flow is clear. Parizot¹¹ July 9 contributes a case to the credit of the method. Between five and six quarts (litres) of water were passed into the organ. A dose of 80 grammes ($2\frac{1}{2}$ ounces) of castor-oil was then administered, and was soon followed by intestinal evacuation.

In a case seen by Schenck, of Cincinnati,⁵³ Nov. 12, 1892, a successful

result followed the introduction of four feet of Langdon's colonic tube, through which 2 quarts (litres) of warm olive-oil were passed into the colon. Kneading of the abdomen after an enema, with complete inversion of the patient, was successfully employed by E. F. Neve, of Kashmir, India.² Abdominal taxis after copious enema, with raised hips, is recommended by R. H. Fox and H. V. Barber.^{3,4}

E. T. Campbell, of Detroit,²⁰² April⁹⁵ employed Senn's method—gaseous inflation—in a case of intussusception. After six gallons of CO₂ had been introduced, copious stercoraceous vomiting occurred, soon followed by a movement from the bowels.

From personal observation of thirteen cases of intestinal occlusion treated by laparotomy, ten of which were successful, Rehn²²⁶ insists upon the necessity of rapid intervention, as in the majority of cases it relieves the strangulation. In a great number of these cases an exact diagnosis can be made before the operation, but often it is difficult. The author attaches great importance to auscultation of the abdomen for the purpose of determining the presence and limitations of peristalsis. It is established that these movements persist in the intestinal segment, situated above the strangulation, and that they are absent in the lower segment. On the other hand, they are entirely absent when peritonitis is present as a complication. From this point of view, Rehn recommends that opium be not given until after the diagnosis has been made, this drug having the effect of causing the peristaltic movements to disappear. Laparotomy should be followed by a search for the obstacle and its removal. This may prove successful in apparently desperate cases. Enterostomy is rarely indicated in cases of acute occlusion.

APPENDICITIS.

Ribbert, of Zurich,²⁰ Sept.¹⁴⁷ after a microscopical and macroscopic study of four hundred specimens of the vermiform appendix, concludes that this organ undergoes, during the life of the individual, a process of retrogression, which manifests itself, as age advances, in three ways: (1) reduction in length, (2) changes in the histological structure of the walls, and (3) spontaneous obliteration of the lumen. He found its average length to be eight and one-quarter centimetres instead of eight centimetres,

as usually taught, with oscillations varying as widely as from twenty millimetres to twenty-three centimetres (Luschka). The average length, according to age, is as follows:—

Newborn,	3 $\frac{3}{4}$	centimetres.
Up to the 5th year,	7 $\frac{1}{2}$	centimetres.
From 5th to 10th year,	9	centimetres.
From 10th to 20th year,	9 $\frac{3}{4}$	centimetres.
From 20th to 30th year,	9 $\frac{1}{2}$	centimetres.
From 30th to 40th year,	8 $\frac{3}{4}$	centimetres.
From 40th to 60th year,	8 $\frac{1}{2}$	centimetres.
Over 60 years,	8 $\frac{1}{4}$	centimetres.

According to the above figures, the greatest length of the appendix is attained between the ages of 10 and 30; its dimensions are relatively larger in the newborn than in the adult. Obliteration of the appendix has already been referred to in the literature on the subject, but, instead of accepting the view that this obliteration is pathological, Ribbert believes that it is a process of gradual involution. He found it obliterated partially or completely in ninety-nine cases out of the four hundred examined,—i.e., 25 per cent. The following table illustrates the percentage of obliteration according to age:—

1 to 10 years,	4	per cent.
10 to 20 years,	11	per cent.
20 to 30 years,	17	per cent.
30 to 40 years,	25	per cent.
40 to 50 years,	27	per cent.
50 to 60 years,	36	per cent.
60 to 70 years,	53	per cent.
70 to 80 years,	58	per cent.

Another table shows that the shorter the appendix the more frequent the obliteration. The processus vermiciformis has usually very little contents. Klebs has attributed this to the fact that the normal musculature regularly voids its contents. All kinds of foreign substances may be found in the appendix, but the most frequent are faecal stones, which are the commonest cause of perforation-peritonitis. He found faecal stones thirty-eight times in the four hundred cases examined. Usually more than one stone is present. The occurrence of faecal stones is equally frequent in both sexes.

J. O. Affleck⁴⁵¹ considers that Talamon's theory, that almost all cases of disease in this locality are due to the irritation produced by scybalous faecal concretions in the appendix, while very

plausible, lacks the support of sufficient confirmatory proof. Thus, of one hundred and forty-six adult cases recorded by Matterstock only sixty-three had faecal concretions, where but nine had foreign bodies. In the remainder, one-half the cases, no such condition was found. Treves supports the view that torsion of the appendix is responsible. But there are frequent exceptions to this view. It is probable that disease in this locality may arise from a variety of causes, the exact determination of which in a particular case is often extremely difficult.

Ekehorn, of Upsala, ⁸⁷²_{V.28, No. 2, 3; June} ⁶⁷³ considers the bacterium coli as a cause of appendicitis. The primary changes in appendicitis—the catarrh and subsequent thickening of the mucous membrane and of the walls of the appendix—are the same in degree and frequency, whether faecal matter be present or not; they are not, therefore, dependent upon the latter, and we cannot with reason infer that the presence or absence of faecal matter has any causal relation with them from our present knowledge. If we admit that virulent bacteria may, after gaining entrance within the processus vermiciformis, induce these primary changes and cause a catarrhal inflammation with intense swelling, œdema, and infiltration of the appendical wall, it is strictly in accordance with our experience of their behavior in other parts of the human organism. The correctness of this supposition, which may in the near future be verified by experimental evidence, has not as yet been proven.

In an appendix thus pathologically affected faecal matter may, through its presence, acquire grave secondary importance as touching the course of the appendicitis, partly through its pressure upon the œdematosus, infiltrated wall, in this way becoming a secondary cause of ulceration, gangrene, and perforation, and partly through diminishing the lumen of the appendix. In consequence of such swelling of the appendical wall, a narrowing is produced at each transverse flexure of the appendix. The stenosis obtains a secondary significance, analogous to that of the faecal matter.

The author seldom found pathogenic bacteria, in great numbers, in the colon. The processus vermiciformis may be regarded as predisposed to infection. The bacteria easily find in it an appropriate medium for their development and for the exercise of their pathogenic functions. As the various pathogenic bacteria differ as to their effects, the appendicitis will present itself under different

forms. It is evident that tuberculosis and actinomycosis of the appendix, not infrequently observed, differ entirely from ordinary appendicitis.

The pathogenic bacterium most frequently found in the colon is the most common cause of appendicitis. This is the bacterium *coli commune* (Escherich). This bacterium may be pathogenic for man and become virulent to a high degree. It is pathogenic for guinea-pigs and other animals used for experimental purposes. The bacterium *coli commune* was present in pure culture in the contents of the processus vermicularis, in a chronic catarrhal appendicitis which was in the intermediate stage of calm, in an exacerbation of a chronic catarrhal appendicitis, and in an acute gangrenous appendicitis. It was observed, always in pure culture, in the peritoneal exudation after a perforating appendicitis, and in the pus from an intra-peritoneal pelvic abscess after perforating appendicitis. The bacteria of the colon from a chronic catarrhal appendicitis that was, for the time being, in a state of calm appeared to be less virulent than the bacteria from a developing or an acute appendicitis, although they were very highly virulent for guinea-pigs, which is analogous to that which has been found true in regard to the bacterium *coli* in normal faeces, on the one hand, and the alvine discharge of diarrhoea and enteritis, on the other.

The author regards it as highly probable that the colon bacillus plays an important etiological rôle and is not present as a passive element. It may be presumed, almost to a certainty, that bacteria are the principal disturbing factors in the acute stage of appendicitis, the faecal matter or the dilatation through retarded secretions being only subordinate factors. In all probability the primary changes in appendicitis (the catarrh and the thickening of the wall) are induced by the bacteria. (Report of Corr. Editor Eklund, Stockholm.)

Morris ⁹⁶ _{Dec. 2 Nov 14} describes appendicitis as an infectious exudative inflammation of the appendix, starting in a break in the guarding epithelium, and progressing by bacterial invasion into the adenoid tissue which is under compression. The natural course is protracted, but may be more rapid when exudation is excessive. The most rapid destructive process occurs when the muscular sheath, irritated to spasm, contracts firmly down upon the swollen inner

tube. Morris believes that all structures of the bowel-wall are usually involved at one and the same time, the focus of infection being at the appendix. Though infection may spread by contact, it usually travels along the lymph-channels.

Symptomatology.—Vander Veer²¹⁶ emphasizes his belief that the McBurney point is of service in establishing a diagnosis. The symptoms, he contends, present an increased degree of seriousness in patients who are, as regards their physical and mental condition, below par; in these cases, also, we are more likely to have an abscess. In robust individuals catarrhal appendicitis is likely to present a large percentage of recoveries, but these same individuals represent the class of cases in which very dangerous and sudden perforative appendicitis may occur. Whenever a patient complains of abdominal trouble, be his symptoms ever so indefinite, he makes it a point to give the abdomen a careful and thorough external examination, and repeat it, if necessary, in twelve or twenty-four hours. In this manner he is able to make a comparatively early diagnosis; but much patience, careful questioning, and careful classification of symptoms are called for.

Affleck⁴⁵¹ believes that, while the diagnosis of the milder and more common cases is generally an easy matter, it is often impossible to decide positively as to the presence of pus in the neighborhood of the appendix. In dealing with any form of appendicitis a rectal examination ought to be made, and will be found, in many otherwise doubtful cases, to assist in establishing a diagnosis. Searching for pus by exploratory puncture, in his opinion, is generally and properly condemned.

In a case seen by Ritchie,³⁶ the symptoms of appendicitis were not well marked. The bowels had moved freely two days previously, and also on the morning of the perforation. The patient was just recovering from an attack of hepatic colic, and had passed gall-stones. One morning severe pain suddenly returned, but lower down than before. The nurse, believing that it was a recurrence of hepatic colic, gave morphine subcutaneously. When seen the patient was suffering from shock, and it was evident that there was a perforation somewhere in the abdomen, causing acute general peritonitis. At the post-mortem it was found that there was a perforated vermiform appendix, and that the gall-stones had nothing to do with the illness.

Pleurisy as a complication of appendicitis was studied by Croizet,²⁰¹⁶ an analysis of 45 cases being given. The propagation of the inflammation takes place either through the retroperitoneal cellular tissue or by way of the lymphatic system. Pleurisy therefore presents itself almost invariably on the right side. In 34 cases reported by Wolbrecht, but 1 presented the complication on the left side. It is rarely double, but when bilateral pleurisy does present itself the right pleura is the first affected and contains the largest effusion. Out of the 45 cases described by Croizet, 3 were of the dry form, in 29 the effusion was serous, while in 13 the liquid was purulent, with marked dyspnoea and intense fever.

As to the frequency of pleurisy as a complication of appendicitis, Wolbrecht observed it 34 times in 89 cases. It frequently passes unperceived, owing to neglect by the physician of the part played by the lungs in the history of the disease in many cases. The prognosis of the appendicitis is only affected by the pyæmic form of pleurisy, the serous form frequently disappearing of its own accord. The lungs should be carefully watched in all cases, therefore, lest the aggravated complication intervene to seriously compromise the result.

Treatment.—Nothing new has been contributed during the year to the medical treatment of the affection. Surgical procedures (see Section C, vol. iii) are pretty generally advocated. W. H. Bennett, of London,¹⁰⁷⁷ who has had considerable experience in these cases, states that the best plan for the general practitioner is to merely drain the abscess, in the first instance, and leave the question of removal of the appendix for consideration later on, if necessary. The course he follows is to lay open the abscess and thoroughly wash it out; if, upon examination, the appendix is found lying free in the cavity, he removes it. If it cannot be easily felt by the finger, he does not search for it, but allows the abscess to heal. This he considers as the most rational treatment and the soundest surgery. It must be remembered that the lives of the majority of these patients are in imminent danger, and that the surgeon's first duty is to save life. Unless the abscess has already burst into the peritoneal cavity, this danger to life can invariably be removed by opening and draining the abscess. At least, he has never, he states, failed in saving life in this way up

to the present time. To search for and remove a diseased appendix at once in a patient already in a highly septic condition, whose general state is certainly not fit to bear what may be a prolonged operation, is to greatly increase the immediate risk to life. This measure is all the more to be condemned since the danger incurred in the removal of the appendix later on, when the patient is in good health, is so small.

Laidley, of St. Louis,⁶¹ also recommends drainage in cases in which pus is likely to jeopardize the life of the patient; the earlier the operation is made, the safer it will be. The public, he thinks, should be informed of the proper estimate placed upon the danger of this disease, and that surgical interference is the only rational treatment.

PERITONITIS.

F. B. Robinson, of Chicago,⁷² expresses his belief that the real significance of peritonitis is lost sight of by most operators because relatively few see the effects of their operation upon the peritoneum. The damage of post-operative peritonitis often appears late unless it kills shortly after the operation. He had operated in the peritoneal cavity of some two hundred and thirty dogs, and post-mortem examinations, performed at varying intervals of time, showed that very few had escaped some local peritonitis; none recovered from general peritonitis; and nearly all showed a patch of peritoneal inflammation. The operations were almost all done for intestinal repair, and scarcely ever was local peritonitis absent. The next point where local peritonitis mainly occurred was along the abdominal wound; such local peritonitis presented dense adhesions many weeks after the operation. He concludes that an abdominal operator can always expect local peritonitis. The evil effect of this local peritonitis, however, is so late in appearing that, if it occur, the operator generally overlooks his share in its production.

Alluding to the general belief that peritonitis occurs in women oftener than it does in men, he thinks that the dead-house will quickly show that both sexes are equally exposed. Women tolerate peritonitis better than men; their peritoneum is thicker, the friction of gestation having probably brought this about by evolution. Peritonitis from traumatism is much more frequent in

men than in women. The main points of local peritonitis in both sexes are (1) in the pelvis; (2) around the appendix; (3) in the hernial rings; (4) around the gall-bladder; (5) at the splenic flexure; (6) at points where the mesenteric glands suppurate.

As regards the first, women have the most pelvic peritonitis, from the facility of the entrance of infection (*a*) through the Fallopian tube, (*b*) through the lymphatics of the uterus, and (*c*) through the veins of the uterus. Appendicitis is much more frequent in men. As to hernia, men have it about twice as often as women, and all strangulated herniae cause local peritonitis. As regards local peritonitis around the gall-bladder, women are subject to it much more frequently than men. Local peritonitis at the splenic flexure is about equal in men and women, as it also is around mesenteric-gland disease. These landmarks of local peritonitis may facilitate diagnosis in abdominal troubles.

Kemmer³¹⁹ _{Oct. 21; Nov. 4}² relates a case occurring rapidly after the administration of an anthelmintic to a patient, aged 21, with an old gastric ulcer. Two years previously she had been under treatment for haematemesis, and since then she suffered frequently from severe gastric pain. Some segments of a tape-worm having been found in the stools, the friends gave her an anthelmintic at 2 P.M., followed by castor-oil. Half an hour later the patient complained of severe pain in the abdomen, which continued. There was retching, but no vomiting. Collapse soon set in, and at 10 P.M., when seen by the author, she was moribund. There was then great dyspnoea owing to abdominal distension, marked abdominal tenderness, and no liver dullness. In spite of efforts to rally her, death occurred an hour later, or within ten hours of the onset. The diagnosis of peritonitis due to perforation of an old gastric ulcer was made, and the author thinks that the cause of this perforation must be looked for in the anthelmintic administered.

Flexner⁷⁶⁴ _{Jan., Feb.} reported a case of peritonitis due to *proteus vulgaris*, R. Boyd⁵⁹ _{Jan. 7} a case of chronic peritonitis with exaggerated nausea, resembling the morning-sickness of pregnancy, and A. Reidel³⁴ _{Nov. 8, '92} a case of chronic idiopathic exudative peritonitis.

Sordolillet⁹⁹⁶ _{Aug. 25} ascribes to the bacterium *coli* commune alone a large proportion of the cases of peritonitis of intestinal origin, but not characterized by perforation. The passage of the bacillus

through the intestinal walls is mainly favored by epithelial desquamation of the lining membrane. Having reached the peritoneum, the bacillus diffuses itself rapidly throughout the entire organism.

F. Ledesma Casado ⁶³² Dec. 1, 192 relates a case in which gastro-enteritis was thus the cause of a sharp attack of peritonitis.

In a case observed by Laveran ⁴¹⁵ July 16; ¹⁵¹ Sept. fatal peritonitis developed after acute articular rheumatism. The autopsy revealed the lesions characteristic of acute suppurative peritonitis, without any lesion of the abdominal organs or of neighboring parts capable of explaining this complication.

Laveran states that the diagnosis of acute rheumatismal peritonitis would seem to be a proper one for the case, except for the fact that an examination of the pus found in the abdominal cavity revealed the presence of streptococci in great numbers. As these germs are not the causative factors of rheumatism, it must be admitted that there was a mixed infection. The rheumatism, acting upon the peritoneum and lessening the vital resistance, favored the invasion by the streptococci of this special serous membrane.

Treatment.—Lawson Tait ²⁶ Dec. 1, 192 concludes, from his great experience in the treatment of the affection, that the purgative treatment of peritonitis or threatening peritonitis, or of anything which seems to be likely to turn out peritonitis, if it be promptly brought to bear on the case, will gain the all-important time, and often it gains such time as will call into action that influence which will eventually turn the scale in the favor of the patient.

Fussell, of Philadelphia, ⁸⁰ May 16 reiterates, in this connection, the great value of salines, with hypodermatic injections of morphia for pain.

Referring to puncture of the peritoneum as a means for ascertaining the presence of inflammatory effusion, Gee ²⁶ Dec. 1, 192 states that a small incision would seem to be justified by conditions such as these: First, the patient is suffering from acute peritonitis, and the indications of poisonous infection of the blood are becoming more and more marked; or next, there are reasons for believing that perforation of the peritoneum has occurred. In either case, unless we can bring relief, the patient must die. A small incision will not make him worse; nay, to drain the peritoneal cavity affords a chance of recovery; the only objection lies in the natural dislike

to an operation, however small. Gee fears that chloroform has a depressing effect upon persons suffering from acute peritonitis. However, suppose a small incision made, and we find that the peritoneum contains pus or air, beyond simple drainage two further courses lie open to us; we may follow John Hunter's suggestion, and wash the belly out with warm water, a proceeding more serious than simple drainage, or we may enlarge the incision and search for the cause of the peritonitis, a proceeding highly dangerous, operations of this kind having seldom any other effect than to hasten the patient's end. A simple puncture, if it do not save the patient's life, will at least bring the satisfaction of knowing that the nature of the disease has not been misunderstood.

ABDOMINAL TUBERCULOSIS.

F. Taylor, of London, ⁶ _{Aug. 5; Sept. 30} ² gave a general review of the subject of abdominal tuberculosis in children. As interesting points he described cedema of the skin, which was sometimes general, as if from cardiac debility; sometimes local, as if from pressure on veins by tuberculous inflammatory materials or otherwise. Tuberculous lesions of the testes and vesiculae seminales were also of interest and sometimes assisted the diagnosis. The results of surgical operation were undoubtedly striking, and so much so that there was no doubt it was a procedure to be recommended. He was still, however, unable to explain the wonderful results in the rapid disappearance of tubercle which have been recorded. The mere removal of fluid did not seem adequate to explain it. Moreover, surgeons did not seem satisfied with simple removal as by paracentesis, but incised, sometimes draining the peritoneum, sometimes merely closing the wound. In the opinion of Varnek,²¹²⁹ the surgical procedure causes a proliferation of connective-tissue elements leading to encapsulation and destruction of the bacilli. A much better explanation is given of the phenomenon by Duran,⁴⁵⁶ July who ascribes it to the bactericidal properties of the air introduced. In two cases he evacuated the effusion by means of the trocar, and then filled the abdominal cavity with as much atmospheric air as he could introduce, the latter having been previously dried by exposure to caustic potassa and disinfected by contact with carbolic acid. The air was left in a few minutes, then evacuated. Slight fever and nausea and intense thirst followed the measure, but the results

were those obtained after laparotomy. The author hesitates to consider this treatment as equal to the more serious operation, but the suggestion afforded is certainly of great value. Nolen⁴ 814 No. 34; Nov. also argues that the curative effect of laparotomy in tubercular peritonitis results from the altered condition following the removal of the fluid from the abdomen, and, following Duran, that the instreaming air produces a chemical, physical, and bacteriological change. The action of light, he considers, has no effect; neither does the manipulation of the peritoneum produce any effect; nor does simply draining the cavity bring about a cure, as is evidenced in puncturing; this would also prove that a change in the circulation alone is ineffectual. Thus, we must believe that it is the contact of the air which produces the favorable result.

The author was thus led to try the insufflation of sterilized air, as the entrance of air in the peritoneal cavity during operation was harmless; and also knowing that Wagner had demonstrated, fifteen years ago, that air could be safely pumped into the peritoneal cavity of animals, he determined to try it in his cases of tubercular peritonitis.

The first case was that of a girl of 8 years. After a puncture in the ordinary way, the fluid reappeared. A second puncture being necessary, this was performed, and immediately warm sterilized air was insufflated. No untoward symptoms developed, and the fluid did not re-accumulate.

The second case was 24 years of age. Here, also, the abdominal condition was favorably affected, but the patient died subsequently of general tuberculosis.

The third case occurred in a woman of 31 years. Here, likewise, there was no return of the fluid. The author would urge this procedure before resorting to laparotomy.

Most modern writers agree, says Barnard, of Paris,⁶ in Nov. 11 regarding the absorption of tubercle deposited on the surface of the peritoneum as a frequent occurrence. Long before laparotomy was heard of as a remedy for this condition, inunction of the abdominal parietes with liniment of mercury or with oleate of mercury had determined many cures. From a discussion that arose on this subject at the Société Médicale des Hôpitaux, it would appear that a variety of therapeutical means suffice to bring about the same happy result. Thus, Rendu presented a woman who had been

cured by intra-peritoneal injections of camphorated naphthol. Admitted into the ward in the month of May with considerable ascites and other unmistakable signs of tuberculous peritonitis, seven Pravaz syringefuls of pure camphorated naphthol were introduced into the abdominal cavity after this had been emptied of seven litres of fluid. Some fever and pain resulted, but both disappeared in a few days. No return of the effusion was noted, and the altered condition of the abdomen enabled a diffused mass of tuberculous deposit to be distinguished. This mass became gradually absorbed, and by August 15th the abdominal walls had regained all their normal suppleness. In the course of the discussion that followed the reading of Rendu's paper, Du Cazal remarked that of all manifestations of tuberculosis that affecting the peritoneum was the one that had the greatest tendency toward recovery, and this under the most diversified forms of treatment,—e.g., blisters, local applications of tinctures of iodine or of collodion, etc. Stranger still, Le Gendre said that he had seen tuberculous peritonitis in a young girl disappear completely in consequence of regular exercise on a tricycle. With regard to the employment of camphorated naphthol, both Le Gendre and Fernet uttered a note of warning, the former stating that he had more than once seen animals into whose peritoneal cavity this substance had been introduced succumb in convulsions.

LEAD COLIC.

Four interesting cases of lead colic—three acute and one chronic—are detailed by Combemale, ⁶⁷ ⁸⁰ May 20; Aug. 15 in which the administration of large quantities of olive-oil gave the most satisfactory results. The drug was found to diminish pain and to clear out the intestines, two essential considerations in the treatment of the malady. From a study of the subject the author concludes: 1. That large amounts of olive-oil, about 200 grammes ($6\frac{1}{2}$ ounces) at a time (it is advisable to diminish beforehand the excitability of the stomach by means of cocaine, menthol, etc.), exercise in lead colic a mechanical and sedative action,—an action not easily or surely obtained by other therapeutic means. 2. That in daily doses of about 50 grammes ($1\frac{1}{2}$ ounces), olive-oil, in one chronic case of the disease, has destroyed all the nervous symptoms present. If this last excellent result be confirmed by future observations, a

- . new hygienic method shall have been found to prevent the occurrence of chronic lead colic. Without disregarding the hygienic measures recommended heretofore to those engaged in lead-works, a daily administration of small quantities of olive-oil may be resorted to,—a method at the same time simple and cheap.

ANIMAL PARASITES AND THEIR EFFECTS.

BY CHARLES S. DOLLEY, M.D.,
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General.—The recent general literature of animal parasitology is briefly reviewed by Braun, ⁵⁰ Jan. 28 reference being made to the contributions of Braun, ²¹⁴⁴ _{B.I.B.145} Calandruccio, ²¹⁴⁵ v.2,p.96 Dewitz, ²¹⁴⁶ _{v.2} Drivon, ²¹⁴⁷ _{v.2} Frenzel, ³²⁰ p.294,91 Graff, ²¹⁴⁸ _{v.1} Grusdieff, ⁵⁸⁶ _{No.18,91} Looss, ²¹⁴⁹ Mejer, ⁸⁸¹ _{p.155,92} Neumann, ²¹⁵⁰ _{v.2} and Railliet. ²¹⁵¹ The semi-popular article by Looss ¹⁰⁷ _{Apr. 16} is a most timely and interesting one, calling attention to the growing importance of a knowledge of parasitism, in the animal kingdom, to the practical physician. The fact that man acts as the host of eight protozoans, fifty-one helminths, and twenty-one arthropods is sufficient reason why, at least, the rudiments of zoölogy should be taught in every medical school. Our domestic animals are only too frequently reduced in vigor and practical value to their owners by the serious reflexes and anaemias set up by the presence of endoparasites, which not only occur in great numbers, but of many species, in the same host; thus, an example is given by Looss of a two-year-old horse in which were observed, living together, over five hundred ascarids, one hundred and ninety pin-worms, several millions of pallisade-worms, two hundred and fourteen other round-worms, sixty-nine tænias, two hundred and eighty-seven back-worms, and six echinococci.

Each year the general profession is giving more attention to parasitology, and the records become more frequent of the successful treatment of gastric and cerebral symptoms of obscure origin by the exhibition of anthelmintics.

From a biological stand-point the investigations of Frenzel, ³²⁰ _{p.299,91} are interesting, as tending to prove that intestinal parasites secrete a special substance (*antiëenzyme*) antagonistic to and neutralizing the action of the digestive enzymes of its host. This protective or neutralizing enzyme ceases to be of use, however, when the parasite is introduced into the alimentary canal of some animal whose digestive processes are different from that of its normal host.

Neumann's work²¹⁵⁰ on the parasites of domestic animals must remain for many years the standard text-book on the subject, covering as it does, most thoroughly, both the ecto- and endo-parasites, their structure, habits, effects, and treatment.

A fact strongly in evidence is the comparative neglect of parasitology in America, owing, no doubt, to the almost general absence of zoölogical teaching in American medical schools.

To throw some light on the obscure subject of helminthiasis in the sick, Valerius Idelson, of Berne,^{26 Nov. 1, '92} has made a statistical investigation, in which he arrives at the following conclusions:—

1. In the sick, intestinal worms occur somewhat less frequently than in the healthy.

2. In patients suffering from internal, gynaecological, and surgical diseases, the parasites are met with less frequently than in those suffering from cutaneous, venereal, and ophthalmic affections.

3. Fever, failure of the subject's general nutrition, and a prolonged confinement to bed tend to decrease the frequency of helminthiasis [of 600 patients examined by the writer, 278 were suffering from fever; of these, only 51 (18.34 per cent.) had ova; meanwhile, of the remaining 322 non-febrile cases, in 97 (30.12 per cent.) the ova were present]. A. Lutz^{50 Feb. 8} contributes a list, accompanied by notes, of the human parasites hitherto determined as occurring among the inhabitants of the Hawaiian Islands. These are confined to *Ascaris lumbricoides*, *Trichocephalus dispar*, *Oxyuris vermicularis*, *Rhabdonema intestinale*, and *Dochmias duodenalis*; the importation of the latter parasite he traces directly to Portuguese laborers from African islands, especially the Madeiras and Azores, who are employed on the sugar plantations of Hilo.

PROTOZOAN PARASITES—SPOROZOA ; RHIZOPODA ; INFUSORIA.

Rhopalocephalus carcinomatosis.—The most interesting contribution of the year in this department is that by Korotneff, of Kiev,^{12 June} concerning his investigations in the life-history of the parasite of carcinoma. To the adult form of this entozoon he gives the name of *Rhopalocephalus carcinomatosis*, referring it to a group of organisms intermediate between the coccidia and the monocystic gregarinæ, showing close relationship to *Ophryocystis bitschlii*. Korotneff summarizes his observations as follows:—

“1. Cancer is malignant only in the case of rhopalocephalus within it.

“2. Rhopalocephalus belongs by nature to the sporozoa, and consists of two stages of development: Amœba and Coccidium.

“3. The respective conditions of these two stages of development are shown by the two kinds of larva, the *zoöid* (‘*zoot*’), which has no inclosing envelopment (‘*hülle*’), and the *sporozoöid* (‘*sporozoooit*’), which has an envelope.

“4. The zoöid, as also the sporozoöid, can develop within either a coccidium or an amœba, with this difference, however, that in a coccidium we usually find only one larva (*zoöid* or *sporozoöid*), while in the amœba we may find many larvae together, and of both kinds.

“5. The zoöid forms a coccidium by encapsulation, but the sporozoöid changes into an amœba when it loses its envelope.

“6. The zoöid, under favorable conditions of nourishment, can enlarge considerably, and assume a gregarina-like form.

“7. The disappearance of the nucleus before or at the time of the formation of the larva (multiplication), either in the case of the amœba or coccidium, is a constant occurrence.

“8. A regular succession of the stages of development (amœba and coccidium) does not occur in rhopalocephalus; it is entirely accidental.

“9. The coccidia, as well as the larvae, are entirely passive, and are driven here and there in the organism, while the amœba move about actively.

“10. Before the larva is formed within the amœba, the latter becomes encapsulated and degenerates proportionately to the formation of the larva,—a circumstance which corresponds with the penetration of the leucocytes into the interior of the cysts.

“11. Leucocytes are necrophags which have nothing to do with living parasites; their rôle is not beneficial, but pernicious, as they form in great numbers around the parasites, and change into corpuscles.

“12. The zoöid and coccidium are *intra-cellular* parasites, while the sporozoöid and amœba are *ecto-cellular* or *inter-cellular*.

“13. After a zoöid has penetrated into a cancer-cell, it may undergo division and form the nucleus (‘*Bildungszentrum*’) of a cancer-pearl (‘*Krebsperle*’).

"14. The pearls form a necrotic area, which, opening outward, takes on the character of an abscess."

An editorial review of previous investigation of the sporozoa and their relation to carcinoma has been made by Dolley.^{9 Jan. 7} The danger of mistaking cell-inclosures of chemical origin for intracellular parasites is pointed out by A. P. Ohlmacher, of Chicago,^{61 Feb. 4} in an interesting article entitled "A Peculiar Nuclear Safranin Reaction and its Relation to the Carcinoma-Coccidia Question." Heneage Gibbs, of the University of Michigan,^{5 July} considers that "the large majority of glandular carcinomata show nothing that can be considered parasitic, when hardened by any method which, applied to normal tissues, will give a typical normal section; and that the appearances in a small percentage of glandular carcinomata are the result of endogenous cell-formation."

Amoeba coli.—August Schuberg, of Wurtzburg,^{50 May 4, 17, 29} contributes a very thorough revision of the communications concerning the parasitic amoeba of the human intestine; beginning with the article by Lambi, announcing the discovery of this parasite in 1859, the successive papers are reviewed in chronological order, the conclusion being drawn that there is more than one variety of parasitic amoeba in man, one being of a pathogenic nature, the other harmless; the latter form occurring frequently in association with *Cercomonas hominis* and *Tricomonas intestinalis*, which appear to be not only harmless commensals, but, as was pointed out by Prudy and Delafond as far back as 1843, in the case of infusorians belonging to the genera *Entodinia*, *Diplodinium*, *Bütschlia*, and *Ophryoscolex*, which appear in great numbers in the first gastric chambers of ruminants, and which seem to take some important part in the digestion of these animals; they also may play a not unimportant rôle in the digestion of man. Schuberg's paper is accompanied by a complete bibliography.

Polimitus malariae.—Mannaberg's monograph²⁰⁹² on the parasites of malaria is the most valuable contribution of the year upon the subject. An account is given of the work of previous investigators, of the various phases exhibited by *Polimitus malariae*, and a theory advanced concerning the nature of Laveran's crescents, namely, that they are conjugation forms or syzygies, which undergo sporulation,—a theory which is upheld by some other writers.^{2 Oct. 14}

Megastoma intestinalis (R. Blanchard, 1885).—There can be

little doubt that this infusorial parasite is much more frequently the cause of gastro-intestinal catarrhs, chronic diarrhoea, and the consequent anaemias than has hitherto been suspected. Moritz and Holzl³⁴,_{22,23} have carefully reviewed the work of Grassi, Lambl, Jaksch, Nothnagel, and others, in connection with their own observations, and prove beyond question that children and phthisical patients are especially liable to infection, and that the duodenum and jejunum may furnish a nidus for almost inconceivable numbers of these parasites. Human beings probably obtain the parasite from food-stuffs containing the encysted parasites in the dejecta of rats and mice; these animals, together with cats, dogs, rabbits, and sheep, being their common hosts. The administration of arsenic, quinine, hydrochloric acid, calomel, and naphthol proved of little use, and extract of male fern alone resulted in the expulsion of the parasites.

General.—Ogata, of Tokio, ⁵⁰_{Aug. 7} contributes an original paper on pure cultures of certain protozoa. The only previous successful attempts in this direction are those of Kartulis, who cultivated amoebæ in bacteria-free pus from a liver-abscess obtained from a patient dead of amoebic dysentery. Ogata succeeded in isolating the infusoria *Polytoma urella* and *Paramecium aurelia* by means of capillary glass tubes, having a lumen with a diameter of 0.3 to 0.5 millimetre and a length of 10 to 20 centimetres. These tubes are dipped into a sterilized culture medium, consisting of 500 cubic centimetres (1 pint) of meat-bouillon (made from 250 grammes— $\frac{1}{2}$ pound—of flesh), 12.5 grammes ($3\frac{1}{2}$ drachms) of grape-sugar, and 25.0 grammes ($6\frac{1}{2}$ drachms) of Japanese gelatin (Nori), obtained from *Porphyra vulgaris*, and allowed to become about half full of the culture medium by capillary attraction, and then dipped into the fluid containing the infusoria and allowed to fill up. Both ends of the tube are then sealed in the gas-flame. In the course of a half-hour the infusoria will be found, by the aid of the microscope, to have burrowed into the culture medium considerably deeper than the bacteria. The tube, being marked, is then broken off and the advance guard of the infusoria isolated, the end of the tube being at once closed again in the flame. The infusoria do not carry bacteria with them in their movement, and the inner medium remains sterile of microbes. These tubes may be kept for considerable lengths of time, or employed in making plate-cultures.

Besides the infusoria just mentioned, another species parasitic in the rectum of a frog was successfully isolated.

Kruse, ⁹³⁰_{p.357, 352} Lindner, ⁴¹_{p.349, 352} and Faggioli ⁴⁰⁹_{p.276, 352} discuss the present state of knowledge regarding parasitic protozoa, the latter alone presenting original matter. Faggioli has investigated the action of the blood upon parasitic infusoria, finding it to be deleterious in most cases, in all probability from the action of the contained chloride of sodium.

TREMATODE PARASITES—GYNÆCOPHORUS; FASCIOLA.

Fluke-Worms.—Prospero Sonsino, of Pisa, ⁶_{Sept. 9} has recently made some interesting discoveries in the life-history of *Gynæcophorus hematobius*, Diesing; he succeeded, after many experiments, in obtaining evidence that certain small fresh-water crustaceans act as the effective intermediate host of this parasite. His conclusions are as follow:—

1. *Gynæcophorus hematobius* has a life-history differing from the typical one of the digenetic trematodes as represented by *Fasciola hepatica*.
2. Its life-history is less complicated than that of the digenetic trematodes; it requires an intermediary host and undergoes a metamorphosis, but there is no alternation of, nor asexual, generation.
3. In this way it resembles, in its life-history, the holostomes rather than the distomes.
4. The intermediary host is a small crustacean.
5. The free embryo, which swims actively about, on encountering the crustacean, attacks the latter at a vulnerable point, and, by means of the papilla at its head, bores and forces its way into the body of this animal after having rid itself of its covering of cilia. Having effected an entrance, it proceeds to encyst itself.
6. The part of the crustacean in which the gynæcophorus cysts are most frequently located is that corresponding to the first segment, and near the eye.
7. The encysted larva, being transferred with the crustacean in drinking-water to the human stomach, is then set at liberty. Afterward, penetrating the intestinal walls, it arrives in the portal vein, where, presumably, it completes its development.

He proposes the term “dicotyle” as an appropriate distinctive

name for the larval encysted stage of *Gynaecophorus harmatobius*. Owing to the size of the intermediary crustacean hosts, even rough filtration through cloth will afford complete immunity. The life-history of this parasite is further elucidated by George Sandison Brock, of Rustenberg, Transvaal, ^{Sept. 9} in an illustrated article on the anatomy and physiology of the gynaecophorus ovum.

The investigations of L. Cahier ²⁴³ _{Feb.} confirm Sonsino, Brault, Villeneuve, and others (ANNUAL, 1893, E-5) in the evidence that Tunis, and particularly the region about Gafsa, is a geographical head-centre for the distribution of this fluke. The characteristic haematuria to which it gives rise is epidemic throughout Tunis, and not at all uncommon among the soldiers garrisoned at Gafsa. ² _{Mar. 11}

Hillmantel ¹⁰⁵² _{Feb. No. 4} reports a case of distomiasis in an Egyptian boy, 12 years old, connected with one of the departments of the Columbian Exposition in Chicago. The discovery of Sonsino, already noted, that the common crustaceans of fresh water are capable of acting as intermediate hosts of this parasite, and the testimony of Lortet ²¹¹ _{Apr. 30} as to the importation of distomiasis into France, indicate the necessity of thorough sterilization of the urine of all patients suffering from this disease, which, according to the last observer, is shown to contain from 3000 to 4000 eggs per day.

A. Lutz, ⁵⁰ _{Mar. 13} contributes the results of his investigations into the life-history of the common liver-fluke (*Fasciola hepatica*) in the Sandwich Islands. He indicates, as the intermediate hosts of this parasite, several Hawaiian *Lymnaidae*: *Lymnaea Sandwichensis*, Gould; *L. umbilicalis*, Mögh; *L. aulacospira*, Anneey; *L. humilis*, Say; *L. compacta*, Pease.

St. von Rátz, of Budapest, ⁵⁰ _{Mar.} shows that the calcareous nodules so frequently found in the liver of the horse consist of the eggs of some fluke, probably *Distomum lanceolatum*.

CESTODE PARASITES—TÆNIA; BOTHRIOCEPHALUS; CYSTICERCUS.

General.—By far the most scholarly and valuable of recent contributions to the knowledge of cestode parasites is that of C. W. Stiles and Albert Hassall, ²¹⁵² _{No. 4 Apr. 10} on the adult cestodes of cattle, sheep, and allied animals. This monograph covers, as Salmon, chief of the bureau, truly says in his letter of transmittal, "the

results of a more thorough and extensive study of the tape-worm of cattle and of sheep than has ever before been attempted," and places these common parasites of our domestic animals for the first time on a scientific foundation. Through the kindness of foreign scientists the authors have been enabled to study the original type specimens of the species heretofore described in Europe, and have, as a result, reduced to some order the extremely confused nomenclature of these parasites. The careful revision of the synonymy of the various species will do much toward rendering future statistics reliable. The paper is accompanied by sixteen beautifully-executed plates, a carefully-compiled bibliography, together with a compendium of species arranged according to their hosts. The authors recommend, for the fixation of cestodes, the following solution: Fifty parts of an aqueous solution of corrosive sublimate, plus fifty parts of alcohol (70 per cent.), plus a few drops of glacial acetic acid. The worms are placed in this liquid, which is heated to 45° to 53° C. (113° to 128° F.). The liquid is then allowed to cool for twenty to sixty minutes. The parasites are next washed in running water from one to twenty-four hours, and passed through 30-per-cent., 50-per-cent., 70-per-cent., 95-per-cent., and absolute alcohol.

Bérenger-Féraud, ¹⁶⁴_{Jan. 16; Jan. 3}¹⁰ whose careful study of the geographical distribution of cestodes was noted in last year's ANNUAL (vol. i, E-6), contributes a statistical study on the number and length of the tape-worms encountered in man, as a result of which we see that 87 times out of 100 there is but one *Tenia saginata* in the intestine; 7 to 8 times, two; 2 to 3 times, three. The occurrence of over five is altogether exceptional. As to the length of the *taeniae*, we find that 52 times in 100 the parasite is at least five metres in length; 39 times, from six to ten metres; 6 times, from eleven to fifteen metres. Length in excess of this is exceptional. One interesting case is cited, however, of a mechanic in the French marines, who had contracted the parasite in Madagascar, three years previous to treatment, who was found to have been the host of three worms: the first, thirty-seven metres; second, forty-three metres; third, seventy-four metres,—one hundred and fifty-four metres in all.

Tenia saginata.—Nabias, of Bordeaux, ³_{Oct. 5, '92} reports a case of the so-called *Tenia noir* (*Tenia nigra*, Laboulbène), and states

that he has made chemical demonstration that the melanotic condition is produced by biliary coloring matter, and not by the blood, and that he has produced, experimentally, tape-worms diversely colored, according to the pigment employed. He finds the pigment deposited principally in the cuticle.

Tænia solium.—J. A. Wessinger, of Ann Arbor, Mich.,¹ reports a case of *tænia* in an infant 5 days old. A. Ernest Samson, in a clinical lecture,¹⁰⁷⁷ points out the marked increase of the prevalence of tape-worms in children after the fourth year of age, and the comparative rarity of *Tænia solium* in England. A case of *Tænia solium* is reported by A. B. Cooke, of Sykeston, North Dakota.¹⁰⁵ The parasite was twenty-three feet in length.

Bothriocephalus latus.—Pariser, of Berlin, records⁴¹ a case of the broad tape-worm seven metres in length in a girl 1½ years old, associated with a small *Tænia saginata*. He attributes the severe anaemia characterizing this case as due to a toxin produced by this worm.

A fact which has been frequently referred to in previous articles in the ANNUAL, viz., that *Bothriocephalus latus* is gradually becoming more frequent throughout Southern Europe, is confirmed by Jules Drivon,²¹¹ who attributes the fact to the consumption in Lyons of fishes received from the lakes of Italy and Switzerland, inasmuch as fishes acting as the intermediate hosts of this parasite do not live in running water.

Tænia echinococcus.—E. Canton, of Buenos Ayres,⁹²⁵ points out the gradual increase in the frequency of hydatids in the Argentine Republic, presenting tabulated statistics for the years 1884 to 1892 inclusive, in which the recorded cases varied by the year from two to twenty-one, numbering altogether sixty-seven. He finds these parasites more common among the emigrants than among the native Creoles, and attributes the greater number of cases to the filthy habits of the former. Adolph Müller, of Munich,³¹ adds to our knowledge of *Tænia echinococcus* by indicating the existence of two forms of this parasite, the one characterized by stout hooks and the absence of an egg-ball in the terminal segment of old specimens. This form seems to have a broad geographical distribution, and appears in its young condition only as *Echinococcus cysticus*. The second form possesses slender hooks, and in the right terminal segment a spherical mass of eggs. It is

found only in Southern Germany and the neighboring regions. The young stage of this form occurs as *Echinococcus multilocularis*. Further observations are desirable for the confirmation of this conclusion.

Tenia nana.—Mertens, of Cologne, ^{Oct. 31, Nov. 7, '92} records the first case of *Tenia nana* in Northern Europe, the parasite occurring in a boy 6 years of age. He treats of this parasite at length, historically and morphologically, the observed cases up to date being recorded as follows: In 1852 Bilharz discovered *Tenia nana* in Egypt, in a boy dead of meningitis. In 1853 Siebold described the worm and gave it its name. In 1873 Sporner recorded a doubtful case from America. In 1879 Grassi found the eggs without determining the species of worm to which they belonged. In 1881, Holez, of Belgrade, recorded the occurrence of the pigmy tape-worm, associated with a *Tenia solium*, in a 7-year-old boy. In 1886-87 Grassi and Calandruccio found in Catania, in the course of a year, seventeen cases of *Tenia nana*. In 1886 Viconti and Segré observed the worms in a 17-year-old girl in Milan. In 1886-87 Comini reported two cases in Paresse. In 1888 Perroncito observed two cases in a 6-year-old boy in Piedmont. In 1889 Orsi and Senna observed six cases in Pavia. In 1889-91 Sonsino secured the eggs from three patients, and one hundred worms from a 6-year-old girl in Pisa. In 1892 Leichtenstern and Mertens observed a case in Cologne.

Reflexes due to Tape-Worms.—Girat, of Neuilly-Saint-Sépulcre, ¹⁷ _{Dec. '92} places on record two cases of pseudo-epilepsy due to *taenia*, which do not altogether confirm the conclusions of Martha in his recent work,²¹⁵³ that "the *aura* is more prolonged, as is the attack itself and the subsequent coma; one side of the body is more strongly attacked; there is elevation of temperature, and bromide of potash is useless." Girat confirms the first and last of the above conclusions and denies the rest. An English journal² comments as follows on the symptoms noted:—

"The first point which will strike the English reader is the similarity of these attacks to the ordinary convulsions of childhood, due, also, to intestinal irritation, such as is caused by the swelling of the unmasticated fruit from a currant-cake, and quickly relieved by an enemata of soap and water. The next point (but one must be a regular reader of French journals to appreciate that) is the

extraordinary instability of the nervous system in the Gallie race. One wearies of case after case in men and women either admittedly hysterical or clearly nothing else. It would seem that their psychological balance is upset as easily as that of our own children of two or three years; and it is to be feared—I hope I am not speaking ungenerously—that the whole system of French medicine tends to encourage rather than eradicate this deplorable state of affairs."

Treatment of Tape-Worm.—American medical journals furnish their usual quota of articles on the use of the standard remedies for tape-worm. The value of cocoa-nut as a taeniacide is again testified to by Linn, of Grand Rivers, Ky.,¹⁸⁶ Dec., '92 Humphrey, of Fairbury, Neb.,¹⁸⁶ May records a case of the expulsion of tape-worms as the result of swallowing tobacco-juice, and reports that he has never failed to rid horses of worms by giving them one to two teaspoonfuls of fine dried tobacco per day in their food. W. H. Bentley, of Woodstock, Ky.,¹⁷⁶ Nov., '92 calls attention to the taeniacial properties of cocoa-nut, pine-tar, and aromatic sulphuric acid, one teaspoonful given undiluted.

NEMATODE PARASITES—FILARIA ; DRACUNCULUS ; TRICHINA ; DOCHMIUS ; ASCARIS ; OXYURIS.

Filaria sanguinis hominis.—Sir Patrick Manson⁶ Oct. 1, '92, Feb. 13 contributes an interesting article on the treatment of *Filaria sanguinis hominis*, according to which his experience coincides with that of Crombie,⁶ Aug. 13, '92 and opposes that of Lawrie and others⁶ Feb. 14, '91 ; Nov. 26, '92 (see ANNUAL, 1891, vol. i, E-17), as to the inefficiency of thymol in this disease. He states that "the attempt to cure filarial chyluria by the administration of a parasiticide is founded on a misconception of the true pathology of this disease and the part played by the filaria in its production. The filaria stands to chyluria very much in the same relation as rheumatic fever stands to heart disease, and gonorrhœa to urethral stricture; it starts the disease process, but its constant presence is not necessary for keeping it up. To attempt, therefore, to cure chyluria by trying to kill the filaria is as illogical and as useless a proceeding as to attempt to cure established heart disease by salicylates, or stricture of the urethra by astringent injections.

"This is evident, if we consider the order of events in the pro-

duction of chyluria, which is as follows: A parent filaria is lodged in the thoracic duct. In some way, not yet understood, it injures the walls of the vessel, causing ulceration or inflammatory thickening. In time this lesion leads to stenosis of the duct.

"*Pari passu* with the development of the stenosis the thoracic duct on the distal side of the stricture dilates, owing to the rising eccentric pressure from accumulating contents. After a time the stricture becomes so narrow that the lymph and chyle no longer find their way past it to the left subclavian vein. They seek, however, to reach the blood by another route; a retrograde movement down the thoracic duct sets in, and so traveling by way of the pelvic lymphatics, the lymphatics in the walls of the abdomen, and the anastomosis between these and the lymphatics of the upper part of the body, the chyle from the intestines and the lymph from the lower extremities find their way into the circulation."

Manson holds that, once established in the human body, the filaria should be left alone, protected rather than persecuted. Pathology indicates that the proper treatment is in principle the same as the treatment of acquired varix in any inaccessible region. This should be rest, elevation, lowering of the tension in the lymphatic vessels by the use of saline purgatives, limited and appropriate food, and abstinence from fluids as much as possible. J. Wallace Collett⁶ confirms the views of Manson as regards the use of thymol and other anthelmintics, as does Charles Williams, of Norwich, England.⁶

Edward Lawrie, of Hyderabad, Deccan,⁶ persists, notwithstanding Manson's criticisms, in maintaining the value of thymol in filarial chyluria.

Von Linstow⁵⁰ repels the accepted hypotheses explaining the presence of these parasites in the blood only at night (see ANNUAL, 1892), and considers this fact due to the physiological tonus of the cutaneous capillaries during waking periods, determining a contraction of their calibre which prohibits the passage of the filaria.

Filaria immitis.—S. D. Van Meter, of Denver, in a paper on *Filaria immitis*,⁴⁵¹ treats of an interesting case of the occurrence of this parasite in a dog, illustrated by a cut showing the heart so filled by the mass of parasites as to prevent every leaflet of the valves from performing its function.

Dracunculus medinensis (*Guinea Worm*).—Owing to the difficulties frequently presented to the surgical treatment of this parasite, R. Atmaram, of Hingoli, ²²⁹ _{Mar. 16}, recommends the following as effecting a more or less complete cure: 1. Asafoetida, in 5- to 15-grain (0.32 to 1.00 gramme) doses for a week, has cured many cases. 2. Nitrate of potash, in 2-drachm (8 grammes) doses, given in buttermilk, cures the disease in from three to five days. 3. The direct application of electricity to the worm-affected part causes its death, and a cure is thus brought about. 4. The application of highly-scented flowers to the affected part is constantly practiced by Vaido and Hakims with good results. The worm comes to the surface, and is easily seized and removed in the usual way. 5. The worm obtains its nutrition chiefly from fatty and nitrogenous substances taken as food, and Oriental practitioners, from the knowledge of this fact, feed persons suffering from this disease on sugar-candy, 1 to $1\frac{1}{2}$ pounds ($\frac{1}{2}$ to $\frac{3}{4}$ kilogramme) for twenty-four hours, without any other food or drink; and it is a well-proven fact that the worm generally dies the next day. These physicians regard this last method as almost a specific. George Kellie, of Bolaram, Deccan, ⁶ _{May 13}, records a rare case of Guinea worm in a dog.

Trichina.—An epidemic of trichinosis is described by Ruelens-Rémy ³⁷⁸ _{Mar. 9} at Herstal, Liers, and at Liége, in Belgium, in which thirty-six persons were affected, with thirteen deaths. This seems to have been the first epidemic of trichinosis in Belgium.

M. J. Alexander, of Austin, Miss., ⁷⁴ _{Oct. 22} in a report of four cases of trichinosis, presents strong proof that motion is of paramount importance and undoubted benefit in the treatment of the disease,—not voluntary motion entirely depending upon the patient's idea of his ability, but motion by force, if need be,—all his patients being unanimous in assuring him that pain was never so severe after a few days' exercise as before. J. A. Taylor, of Gridley, Ill., ¹⁹⁶ _{June} claims great advantage in the use of sulphite of soda in trichinosis; 1 drachm (4 grammes) doses to be given well diluted every four hours until free catharsis is produced, then followed by 15-grain (1 gramme) doses every four hours until the stomach symptoms subside, which usually occurs in from forty-eight to sixty hours. Tonic and supportive treatment is then instituted. F. W. Wilcox, of Minonk, Ill., ¹⁹ _{Aug. 12} reports several cases of trichinosis.

As regards the retrograde changes in trichina and their capsules, Robert Langerhans, of Berlin, ²⁰_{B.90.H.2} ⁴⁵¹_{Apr.} presents evidence that trichinæ, together with their envelopes, are subject to degenerative conditions, and eventually and naturally reach a stage of elimination from the body of their host. Recovery from the invasion of these parasites is not, therefore, complete with the calcification of the trichinæ, but with the total elimination of both the animals and their envelopes. According to the report by A. J. Wartanoff on the occurrence of trichinosis in Tiflis, ²¹⁵¹_{No.2, 1912} this form of parasitism is comparatively rare in Russia; only four positive cases have been recorded in Transcaucasia.

A. S. Barnes, Jr., ⁷⁸⁶_{July} recommends the following method of demonstrating living trichinæ: An old cat or rat is killed, and the muscle from between the ribs, also the diaphragm and muscles of the thigh, are extirpated. A piece is nipped from each of the specimens and placed between two slides, which are pressed together and examined under the microscope with about a one-inch objective. If the trichinæ are found to be present in their cysts, a piece of the muscle the size of a pea is placed in the following solution in a small bottle: Rx Pepsin, 3 grains (0.20 grammes); water, 2 drachms (8.00 grammes); hydrochloric acid, 2 minimis (0.13 grammes). As this is to duplicate the process of digestion, the fluid must be kept at body-temperature, preferably in the trousers-pocket or in a warm oven. The fluid is to be shaken every little while; in about three hours, sometimes less, the meat will be dissolved, as well as the cyst which contains the trichinæ. The fluid is then poured into a conical-shaped glass to allow the trichinæ to settle to the bottom, which operation will consume about ten minutes. A pipette is then introduced into the glass near the bottom, and the contents placed in a glass cell, which should be large. This cell is placed under a dissecting microscope, and the trichinæ taken out by means of a pipette and placed in clear water. They are again picked out of the clear water by the same method, and placed in a drop of pure water in the centre of a glass, cement cell, or in a live-box, and a few minutes allowed for the worms to settle to the bottom. A cover is put on and sealed with white vaselin. It is now ready for examination on a hot stage under the microscope, where the worm may be enlivened at will by the heat.

Dochmias duodenalis.—According to the monograph of J. B. Agnoli, of Lima, Peru,²⁰⁰² dochmiasis is probably much more frequently the cause of anaemias in tropical America than has heretofore been suspected. He describes several cases in his own practice, and leans to the opinion expressed by Birch-Hirschfeld, Lussana, Runeberg, F. Müller, Dehio, Moosbrügger, and others, as to the grave anaemias caused by various parasites (*Tricocephalus*, *Bothriocephalus*, and *Dochmias*), viz., that the anaemia is not the direct result of the presence of the worm or the loss of blood, but that it is due to some toxin emanating from the parasite. The case cited by Cecilio S. Lopez, of Buenos Ayres,⁹²⁵ _{Nov. 1902} confirms the statements of Agnoli concerning the wide distribution of dochmiasis in South America.

The occurrence of dochmiasis in North America is, however, rare, and in nearly all cases the patients are not natives of the country. A case of this kind is reported by W. L. Blickhahn, of St. Louis, Mo.,⁹ _{Dec. 9} who points out that the diagnosis in this case was based upon the presence of the ova, and urges the necessity of microscopic scrutiny of the dejecta in all cases of anaemia. Frequent examinations of the stools is necessary for weeks after the supposed cure.

If the views of Giles and Sinclair be correct (ANNUAL, 1893, vol. i, E-20) that beriberi is identical with dochmiasis, then the disease imported in November, 1893, into Philadelphia by the steamship *Lanark*, and in October, 1892, into New York by the British bark *H. B. Cunn*, and noted in the local press of the time, must be included in the record of dochmiasis in the United States.

A. Bernheim⁶⁹ _{p. 305} reports a case of dochmiasis in Germany in which a large number, both of the parasites and ova, were found in the discharges. The treatment, which was successful, consisted of extr. filicis maris and syrupus simplex, à à 15 grammes (3½ drachms), given in three doses, a subsequent dose of 50 cubic centimetres (1½ ounces) of castor-oil completing the cure.

Prospero Sonsino, of Pisa,⁶ _{Nov. 19, 1902} while disparaging the general use of thymol as an anthelmintic remedy, testifies as to its efficiency in dochmiasis.

Ascaris lumbricoides.—Valude, of Vierzon,²¹² _{July 10} records the escape of an ascarid by the umbilicus, in the case of a boy aged 14 months. A case of typhlitis or appendicitis caused by ascarids

is described in detail by X. Gouraud and Martin-Durr.^{100 July 11} The relation of ascarids to various neuroses is discussed by Alston, of Trinidad,^{6 Feb. 11} whose objections to the important part which these entozoa play in the etiology of disease are strongly negatived by the experience of Beaven Rake^{6 Nov. 26, '92} and Percy Randall^{6 Dec. 3, '92} (in his voyage in charge of 557 Indian coolie emigrants from Calcutta to Demarara), as well as by that of Alfred T. Corrie^{2 July 15} and W. Henry Hillyer,^{6 Oct. 1, '92} all of whom record cases of marked constitutional disturbance or death from irritation of ascarids.

John Penberther, of the Royal Veterinary College of London,^{6 Feb. 25} offers a number of clinical facts regarding the effects of ascarids in domestic animals, indicating an intimate association of the parasites with epileptic attacks in these animals.

Theo. W. von Tschernomor-Sadernowsky, of Kiev,^{366 July} supplements the report of F. C. W. Haunsell,^{2 p. 621} of an "unusual number" (ninety-six) of *Lumbricæ* in a child, by the case of a $2\frac{1}{2}$ -year-old child, from which he obtained 208 ascarids, from a second case 280, and from a third 100. He also refers to a case⁵⁸⁶ in which 250 specimens were secured from a 12-year-old patient. N. Miller, of Moscow,^{366 Aug.} records a case of an ascarid in a 3-week-old child, and gives the statistics of the occurrence of this parasite in young children. He also refers to the cases of Valz and Steinberg, who obtained from a child, in the course of one month, 900 and 500 specimens, respectively; also the case of Petit, who counted, in the course of five months, 2500 in a child; and that of Fauconeau-Dufresne, who secured from a 12-year-old child, in the course of three months, 5126 ascarids. Miller believes that the effects of these parasites are not due to their movement alone, but also to a poisonous substance which they excrete (*exopro excretorio*).

Prospero Demateis^{50 Nov. 21, '92} discusses the effect of high fever on intestinal parasites, causing unwonted activity on the part of these entozoa, and a consequent wandering or possible perforation of ulcerous patches. Victor Immerwol, of Jassy,^{118 Oct. '92} contributes the result of his observations on verminous abscesses, in which he points out the rôle of these entozoa in intestinal perforations.

Oxyuris vermicularis.—A. Ernest Sansom,^{1077 Apr. 26} in a clinical lecture on thread-worms in children, states that he considers these parasites as among the most potent of all debilitating factors in the children of the poor, and that their influence for evil is far

more direct than is commonly supposed, although the signs that betray their presence are generally well marked. He is of the opinion that the eczemas and impetigos of which the host of the parasite is the subject are due to a peculiar irritant material contained in the tissues of the parasite, and which explains its local action (*cf. von Heuber* ³²⁶ _{p. 450, 70}). A step farther takes the local irritation to the nares, the mouth, the pharynx, and the tonsils. No other cause exists, in Sansom's opinion, for the superficial ulceration of the tonsils which is observed, and which, by a recurrence, leads to hypertrophy of the tonsils. A valuable diagnostic sign, the prominence of the circumvallate papillæ, he holds to be the direct effect of a local irritation, giving rise to a cough of a peculiar character,—violent, paroxysmal, and described by the parents as like the barking of a dog. Reflex phenomena are directly referable to oxyurides. They may affect the heat-centre, giving rise to what is known as worm fever, the axillary temperature rising as high as 105° F. (40.6° C.), and falling to normal after the expulsion of a mass of oxyurides. As regards treatment, the indications are: 1. To expel the intruders and all their ova, to accomplish which simple aperients may be employed and kept up for several weeks, accompanied by intestinal irrigation with pure, cold water, in which the parasites swell up and burst. In rebellious cases, Hegar's funnel-system apparatus is recommended. ²¹⁵⁵ _{p. 64} 2. To prevent the entrance of ova into the alimentary tract by scrupulous attention to the diet, all milk and drinking-water should be previously boiled, all the meat given should be well cooked, and all the food should be *clean*. The hands should be frequently washed with tar or carbolic soap.

B. H. Nicholson, of Colchester, Eng., ⁶ _{Jan. 7} likewise insists on the necessity of avoiding uncooked food, vegetables, fruit, sweets, etc., and anything likely to produce catarrh and increase the mucus. The child should be bathed twice daily, the underclothing changed frequently, the nails kept short and clean, and the fingers dipped frequently into an infusion of quassia. The patient should be isolated during the period in which the oxyurides are being expelled, be kept from school, should sleep alone, and not be allowed to mingle with other children. J. A. Hawkins, of Pittsburgh, Pa., ⁹ _{Feb. 11} records a case of poisoning from the use of enemata of carbolic acid for the expulsion of oxyurides.

D. S. Coles, of Wakefield, Mass., ¹⁸⁶_{Oct., '92} strongly recommends a local application of creolin as a remedy of great excellence for oxyurides.

ECTO-PARASITES.

In a paper read before the Indiana Academy of Science, Robert Hessler, of Indianapolis, ²¹⁵⁶_{p. 348} describes an interesting case of Norway itch (*Scabies Norwegica* or *S. crustosa*), a form almost unknown in America, caused, so far as is known, only by the itch-mite of the wolf (*Sarcoptes scabei*; var., *lupi*), transmissible to man. J. Sanchez ¹⁷⁹_{p. 400} reports on the poisonous invertebrates of Mexico.

PSEUDO- OR FACULTATIVE PARASITES—FLY-LARVÆ, ETC.

G. Joseph, ¹⁵³_{Apr. 13, '29}, in a most interesting communication made to the Société Française d'Hygiène, on myiasis or maladies produced by the larvæ of parasitic flies, and by the transportation of contagious materials to man by certain flies, gives an historic and systematic review of this important department of parasitology. He groups the various cases of myiasis as:—

1. *Myiasis larvosa externa*. (a) *Myiasis externa muscosa*; (b) *Myiasis externa larvosa œstrosa*; according as the phenomena are caused by the presence of larvæ belonging to the family *Muscidae* or *Oestridæ*.

2. *Myiasis larvosa interna*, by which he designates those affections of the digestive canal caused by the presence of living fly-larvæ.

3. *Myiasis imaginosa*. Sickness caused by the bites of flies and the transportation of infectious material by certain flies.

J. B. Nelson, of Seattle, Washington, ²¹⁵⁷_{Nov.} places on record several cases of maggots in the ear. That *Myiasis aurium* is not uncommon in America appears also from the testimony of H. Percy Hurley, of Rogers, Texas. ⁸⁵_{Jan. 28}

Miyake and Scriba, of Tokio, Japan, ⁴_{No. 16}; ¹¹²_{Aug.} publish a description of a new human parasite, a mite which they name *Nephrophages sanguinarius*, the male and female of which are about one-fourth the length of the itch-mite of man (*Sarcoptes scabei*; var., *hominis*), but which infect the internal organs. The parasites and their eggs were found in the urine of a man suffering from haematuria.

DISEASES OF THE KIDNEYS, BLADDER, AND ADRENALS; URINALYSIS; DIABETES.

BY R. LÉPINE, M.D.,

LYONS

DISEASES OF THE KIDNEYS, BLADDER, AND ADRENALS.

PHYSIOLOGY OF THE KIDNEYS AND BLADDER.

Suter and Meyer ²⁷³_{v.22,p.24} utilized an opportunity of comparing the secretion of the two kidneys in a child suffering from exstrophy of the bladder. Contrary to the opinion of several authors, the function of both kidneys was found to be equal, and the urine from both did not differ in quantity nor in the amount of urea and phosphoric acid. They observed that the minimum occurred between 3 and 4 o'clock in the morning, near the time of awakening, increasing gradually until a maximum was reached at a varying hour of the day. The acidity was always very pronounced during the night, feeble in the morning, and variable in the afternoon.

Quincke ²⁷³_{p.211} states that in healthy subjects the quantity of urine passed during the night, as compared to that passed during the day, is as one to two, or even to four; while in pathological states it is as two to one; and that this increase in quantity corresponds to an increase in solids. (See farther on.)

According to Leo Liebermann, ²⁴⁶_{v.54,p.586} if the lecithin-albumen from the renal cells be filtered through defibrinated dog- or ox-serum, the filtrate is acid. This experiment throws new light upon the process of urinary secretion, and may even, in certain cases, explain uric-acid calculi in the kidney. He maintains, in opposition to Halliburton, that the substance of the renal cells is acid, and not neutral or alkaline; if at the time of death it appears so, it is because its true reaction is disguised by the combination with alkaline salts.

Franklin Vivenza ³⁷⁶_{v.4,p.23} states (1) that the specific gravity of the blood of the renal vein, generally greater than that of the arterial blood, depends upon the quantity of water and solids elimi-

nated, which in turn depend upon the state of the blood-pressure and the secretory activity of the cells; (2) that the blood of this vein is more alkaline than the arterial blood; (3) that the blood in traversing the kidneys undergoes an absolute loss of haemoglobin, probably proportional to that of the water, and a loss of red cells; but that the destruction of haemoglobin is greater than that of the cells; (4) that the resistance of the red globules of the venous blood to chloride of sodium and acetic acid is greater than that of the arterial blood, which would go to show the greater diffusibility of the haemoglobin.

Béchamp¹⁰ still insists upon the existence, in the normal state of unfiltered urine, of a ferment precipitable by three volumes of alcohol at 90 per cent., having the power of converting sugar into starch, having the reaction of albuminoid matters, but differing from the albumen of serum in that the precipitate is soluble in water, while the albumen of serum is coagulated and precipitated at the same time by a sufficient quantity of alcohol. This ferment is always present in normal urine, independent of age, diet, fatigue, etc.

Brown-Séquard and d'Arsonval⁹²⁷ believe that in cases of anuria lasting several days and not followed by death, in spite of the accumulation of toxic substances in the blood, the non-fatal result is due to the fact that the kidney throws into the blood, by an internal secretion, products which antagonize the action of the toxic substances. To support this theory, they state that they have performed experiments on animals previously subjected to nephrotomy, by injecting extract of the kidneys, and thus obtaining, first, an absence of uræmic symptoms, as well as that the animal lived a marked length of time afterward. They conclude, from this experiment, "that uræmic symptoms are due not to the accumulation in the blood of concremental principles which should be eliminated by the kidneys, but only to the absence in the organism of the internal secretion of the kidneys."

Franz Hofmeister,⁵⁴ with several others, insists upon the presence of microbes in the normal human urine, and, therefore, the necessity for the pathologist to ascertain whether an organism found in the urine is really pathogenic, and also whether normal urine may contain staphylococci! The diplococcus found in the normal urethra is of no importance in the pathogeny of cystitis.

Landergren and Tigerstedt⁵⁰⁸ have studied the irrigation of the kidney in the dog by means of Ludwig's haemodromometer (*stromuhr*), and find that the quantity of blood passed in a given time by the renal artery is very variable, and that these variations are independent of the general tension. With Munk, they noted an increase of the irrigation under the influence of diuretics, temporary and depending upon the dilatation of the small vessels of the kidney. This increase, even with strong aortic pressure, leads to a lowering of arterial tension in the kidney. Naturally the blood is quickened, and the weight of the blood received by the kidney in one minute exactly equals its own weight. Admitting, with Tigerstedt, that in one minute the quantity of blood leaving the left ventricle equals 5.1 per cent. of the weight of the body, it will be seen that the kidney receives about nineteen times more blood than the tissues of the other organs taken together.

Grijus¹⁸² has compared the temperature of the urine leaving the kidney and that of the aorta. In seven experiments the temperature of the urine was greater, but in many others it was lower. It was remarked that the urine was higher in temperature when it flowed abundantly, but the relation between the temperature and the specific gravity could not be determined, and the author himself recognizes the difficulty of these experiments.

Zeissl²⁴⁶ has observed the pressure of urine in the bladder and the volume which flowed from the urethra in the curarized dog. Excitation of the *nerri erigentes* from the first three pairs of sacral nerves produces a contraction of the detrusor and relaxation of the sphincter, which follows several seconds after the contraction; the hypogastric nerves are antagonistic, in that they contract the sphincter; they scarcely act upon the detrusor.

Lewin and Goldschmidt⁴³² have sought to solve experimentally the questions as to whether the bladder can return the liquid into the ureters. After death this is impossible; but in certain conditions in the living it is not so, as may be seen by these experiments, which were made exclusively upon male rabbits, in which the ureteral orifice is narrow and barely visible, and, as in man, the ureter courses obliquely through the bladder-wall, the ureter itself being very small and cord-like. The fluids injected were milk and staining-fluids, and, just as in man, the ureters could not be injected from the bladder after death. The fluids

were first injected with high pressure, under chloroform. The abdomen opened to view the ureters, but nothing seemed to pass. Even in the most successful attempts, only the minutest trace of the bladder contents could be found in the ureters. Then an unexpected change occurred in the results. Some milk was made to flow into the bladder from an irrigator, moderately distending the bladder, which apparently resisted the pressure, and, whilst keeping up the same pressure, the abdomen was opened, and the right ureter was seen to be distended with milk, which jetted out on dividing the ureter. This outflow continued as long as irrigation was kept up without the bladder undergoing any change of volume. The ureter was quite full of milk as far as the renal pelvis. This experiment alone proves the incorrectness of the accepted view. Further experiments clearly showed the reasons of failure or success in result, the necessary condition of the latter being that the bladder should still be contractile and not overdistended, for over-distension acts as an obstacle to the reflux, and it was often noticed that as soon as the ureter was distended it could no longer contract. With smaller amounts of fluid in the ureter it would seem that the ureter is capable of discharging its contents back into the bladder, and that is why one ureter was generally fuller than the other.

ACUTE BRIGHT'S DISEASE.

Fiessinger⁹² reports several cases tending to prove that, with the exception of concomitant scarlatina, certain cases of Bright's disease follow the same method of evolution as infectious diseases in which the germs are but slightly virulent, and that, in proportion to the progress of the disease, if the majority of cases terminate in recovery, there are others which end either in death or in a chronic form of the disease.

Black Milne²,^{Deo. 24, '92} presented, at the Sheffield Medico-Chirurgical Society, a note on the etiology of Bright's disease. In one house three healthy children were almost simultaneously attacked, inquiry giving only negative results. A source of origin was suggested in the presence of an offensive privy, hidden in a small back-yard near the kitchen-door, in another instance, where two children in one house were suffering from acute nephritis. Patton⁷²,^{Deo., '92} publishes a case of dilatation of the heart in a child of 12 years affected with acute nephritis.

Lancereaux²⁶⁶ describes, under the name of "primitive epithelial nephritis or nephritic fever," a nephritis consecutive to a chill, and which is usually characterized by three phases,—the first, fever; the second, anasarca and albuminuria; the third, uræmia,—and lasting generally for weeks or months. This nephritis is curable in the majority of cases. Death follows uræmic complications. The epithelium of the convoluted tubules is much altered, the glomerules comparatively free. The disease is easily recognized through the urine (deeper color, increased specific gravity, fibrinous casts, and desquamated cells) and by dropsy. As treatment, Lancereaux recommends several drops of tincture of cantharides. (It is known that the utility of this treatment is much disputed, and that it is generally advised to abstain from following it.)

The same author²⁶⁶ presents a general article upon pyretic nephrites, which are, according to him, essentially toxic nephrites. The urine is diminished in quantity, the specific gravity is relatively feeble, its color pronounced, and albuminuria frequent, but not constant. The deposit contains leucocytes, red globules, altered epithelial cells, sometimes by granular cells, and in certain cases by specific microbes. If there be delirium, it is necessary to determine whether it depends upon uræmia, in which case the delirium will be that of action, the patient trying to get up, etc. Headache will also be present, sometimes dyspnœa and involuntary evacuations; if there be, at times, hallucinations, these will be slight, and not terrifying. Death from coma is easily avoided by energetic treatment, and, the principal disease being arrested, the complication is also arrested. As treatment, Lancereaux advises ipecac-powder as an emetic, and caffeine and ether combined.

Pansini⁵⁸⁹,_{10,12} has studied acute primary nephritis from a bacteriological stand-point, and suggests that the diplococcus lanceolatus of Talamon-Fraenkel, which is found in the normal urethral canal, may migrate upward through the urinary channels; but it is also probable that, in some cases, the diplococcus may be carried from the air to the kidneys through the blood.

Rasch³⁷³,_{p.541, n.} observed a child, 7 years old, who, after a slight attack of angina, became feverish, vomited, had strabismus convergens of the left eye, and collapsed. In the urine were found

pus-cells and masses of micrococci, but no casts. A week later blood was found in the urine, and a petechial eruption appeared on the trunk, arms, legs, conjunctiva, and palate. A month after the commencement of the disease there was a purulent discharge from the right ear. Death occurred in a few days. At the autopsy the kidneys were found to be swollen, with dark-red spots on the portio corticalis, the size of a pea, partly softened, and containing whitish points; in the points were found diplococci, strings of streptococci, and masses of cocci, conforming to the descriptions given by Faulhaber of the pneumococci Fraenkel, in the kidneys. They colored after the method of Gram, developing on agar, but not on gelatin. Nothing abnormal was found in the brain, abdomen, or organs of the thorax. The ear was not minutely examined, but the author believes that it was the focus from which the kidneys received the infection, and points to the necessity of always examining the ears of small children when the origin of an infection cannot be found in another part of the body.

Fernet⁴²⁰ _{Dec., '92} observed a case of acute infectious nephritis in a young woman of 18 years, who had enjoyed habitual good health, but who had had an abortion two months before. The course of the disease much resembled that of typhoid fever, except that she had haematuria and vomiting. Papillon, interne of the hospital, found in the urine a great number of coli bacilli in pure cultures. The disease terminated on the twenty-fifth day. No casts were found in the urine. Netter, in the discussion following the communication, said that he had seen a similar case, with a temperature of 41° C. (105.8° F.) in a typhoid state, with haematuria, no casts in the urine, but bacilli which were exclusively coli bacilli.

Rendu also cited a case of suppurative pyelo-nephritis caused by the coli bacillus. He thinks that in this case the suppuration had taken place by the urinary passages; in fact, for three months the patient had pain in urinating, with no anterior hemorrhagia, and the urine was cloudy.

Chantemesse and Vidal³ _{Jan. 4} also observed a case of pyelo-nephritis of the same origin in a woman of 42 years, supervening on convalescence from typhoid fever. Several days before her death the coli bacillus was demonstrated in the urine in great abundance, in a state of purity, causing great fermentation of lactose. It therefore seems necessary to make a distinction between

this bacillus and that of Eberth. The two may be differentiated by the fact that the typhoid bacillus cannot be grown in a medium in which it has already lived, and by the absolute impossibility of making lactose ferment with the typhoid bacillus, whatever is its virulence. Another distinctive sign consists in a morphological difference: each young element of the bacillus of Eberth shows twelve to fifteen flagellæ, while the spores of the coli bacillus can number only four to eight.

Perl⁴,₁₀ states that a child of $2\frac{3}{4}$ years of age showed a cloudy urine five days after being vaccinated, the quantity being small, with albumen in the proportion of $\frac{1}{2}$ to 1000. The sediment contained white globules and casts. There was no fever or other disease. The nephritis disappeared in six days.

Kahlden⁷⁶⁸ has studied the histological lesions in acute nephritis in several cases, using the hardening method of Flemming. The following are his results. Pneumonia: In ten cases, even when albuminuria was absent, there was degeneration of the convoluted tubules, which were filled with granular masses; often, even, alteration of the loop of Henle. In several cases the nuclei failed to stain; the cells of the glomeruli were intact, or nearly so; no diplococci were found in any of the cases. Scarlatina (five cases,—three in the beginning of the disease): The histological lesions were quite similar. The author believes that between albuminuria in the commencement and post-scarlatinal nephritis there is only a difference of degree. Measles (five cases): The epithelium of the glomeruli and the endothelium of the intertubular pillars were fatty. Typhoid fever (six cases, at various periods): Here also fatty degeneration and desquamation of the epithelium of the convoluted tubules and of the ascending branch was found. Diphtheria (ten cases): The same lesions. It might be added that in certain experimental cases of intoxication the author found the same lesions, and therefore disputes the opinion of Nauwerck that beginning nephritis is an interstitial process; according to him, this process is secondary.

Aufrecht³¹⁹,_{5, 6, 72} found, in the kidneys of three patients who died of cholera, after twelve to twenty hours of algidity, lesions especially in the right canals of the medullary substance, which were filled with hyaline casts. In certain places the epithelium was joined in yellow blocks.

Bothezat³⁴⁸ has observed a case of acute nephritis with grave uræmic symptoms in a person affected with pustular scabies. The rarity of renal inflammation as the result of the itch, he remarks, may be real, and due to the fact that such limited cutaneous lesions are hardly capable of producing it; or it may be only apparent, the kidney being so slightly affected that the trouble is not diagnosticated.

The question of nephritis in mumps, much discussed some years ago, has recently been revived. The Society of Hospitals of Paris,⁴²⁰ Mar. 8, 10 on the occasion of a paper on albuminuria (without bacteriological examination) in patients affected with mumps, have considered the subject, Bézy, Toussaint, and Laveran giving their experience. In the case reported by Toussaint, there was, besides albuminuria, almost complete anuria for forty-eight hours; so that, in this case, at least, the presence of nephritis was probable.

Ralfe¹⁰⁷⁷ Aug. 16 thinks that often too grave a prognosis is given in acute catarrhal nephritis; he recommends a milk diet. Legendre⁴³⁹ v. 6, p. 14 believes that from neglect to examine the urine acute nephritis in the child is often passed by without recognition. Contrary to Ralfe, he discards vapor-baths, and advises cutaneous revulsives, non-irritating diuretics, disinfection of the digestive tract, chalagogues, and inhalations of oxygen. Acting² June 17 praises the use of methylene blue, believing acute nephritis to be due to a microbe. Sacaze⁹² Jan. recommends venesection as a means of ridding the blood of toxic principles in cases where acute nephritis is accompanied by uræmic symptoms; it may also, according to him, be employed in typhoid fever; but the quantity of blood removed should be small, serving to avert the uræmic symptoms without enfeebling the patient.

Acute Toxic Nephritis.—Lewin⁶⁹ Sept. 21 reports the case of a man who, after a subcutaneous injection of 0.1 gramme ($1\frac{1}{4}$ grains) of salicylate of mercury, had stomatitis, with ulceration, together with acute nephritis (anuria and albuminuria). The temperature rose to 40° C. (104° F.). The patient was in danger of death, and Lewin attributes his condition to the mercurial injection. It is worthy of note that in this case there were no intestinal complications (except slight constipation). The author also calls attention to the intense albuminuria observed in this case, which is not the rule in mercurial intoxication, as well as to the fact that the urine was not

overcharged with lime. In reference to this communication Fürbringer states that, according to his own statistics, one-twelfth of the cases of mercurial poisoning showed slight and transitory albuminuria.

Fraenkel and Reiche²⁰ report three cases of nephritis consecutive to injection of sulphuric acid. In the first case death occurred after five days. The authors found coagulation necrosis in the convoluted tubules of the kidney (as already observed by Armen Huber in one case), and pigment in the same canals and in the loop of Henle. The two other cases succumbed only at the end of several months to gastric lesions; cicatrices of the kidneys with loss of substance were found.

CHRONIC BRIGHT'S DISEASE.

Lancereaux¹⁴ calls attention to the epithelial nephritis which may follow in the course of syphilis, tuberculosis, and leprosy, and which are quite distinct, either by the interstitial lesion or the amyloid degeneration, which may be seen also in a similar case. Epithelial nephritis begins quite suddenly, as does subacute nephritis, but its progress is slow. The urine is not abundant, is strongly albuminous, and the prognosis always grave on account of the danger of uræmia. Stephanowicz⁸ has observed three cases of nephritis following malarial fever, in which the symptoms, including albuminuria, disappeared on the administration of quinine.

Da Costa,⁵ in common with other authors, calls attention to albuminuria and Bright's disease existing in connection with the uric-acid diathesis and oxaluria. Treatment consists principally in suitable diet. Bondurant²¹² relates a number of cases, and gives statistics showing the frequency of nephritis in insanity (seven being in colored persons).

Lancereaux²² gives a good description of saturnine nephritis. The pathological changes found in the kidneys, according to him, are so characteristic that there can be no doubt as to the origin of the condition. Both kidneys are simultaneously and symmetrically affected, which is not the case in vascular nephritis. At first the organ is large, but it soon shrinks, becomes firmer in consistence, granular in appearance, with some dilated veins here and there. In the atrophic stage the whole kidney surface is granular, the

granulations varying from the size of a millet-seed to that of a lentil. The symmetrical character of the affection points to a constitutional cause. The capsule is somewhat adherent, but shows very little thickening; the organ is firm and tough, and on the whole the condition resembles that form of atrophic cirrhosis characteristic of the wine-drinker's liver. On section the cortex is considerably diminished in size, and dotted all over with yellow spots which correspond to the granulation visible on the surface. There is atrophy of the pyramids, but no dilatation of the pelvis and calices. We are thus enabled to distinguish the kidney of lead poisoning from that of atheroma or arterio-sclerosis. In atheroma the two kidneys are not equally and symmetrically affected. The surface is red, irregularly granular, and shows a number of cysts and depressions. In arterio-sclerosis the pelvis and calices are somewhat dilated and the pyramids flattened. Further, the thickening of the walls of the arteries and the obliteration of the small arterioles which are so characteristic of vascular nephritis are never found in the nephritis of lead poisoning, and, lastly, the co-existence of uratic arthritis is an important diagnostic point in favor of the case being one of nephritis due to lead poisoning.

The microscope shows that the connective-tissue stroma is the chief and primary seat of the changes, and this is most marked at the base of the pyramids. Both the cortex and medulla are diminished in thickness; the interlobular arteries and the arterial arches are normal, save for some thickening of the adventitia; the glomeruli are atrophied and fibrous, and the tubules are compressed and obliterated by the growth of young connective tissue. The tubules have their lumen contracted, and their walls are lined with small cubical cells containing a prominent nucleus. The epithelium of the ascending branch of the loop of Henle is normal, and the tubules are free from cellular and fibrinous casts, and only occasionally present deposits of urates.

Chauffard¹⁴ Nov. 9, 92 publishes the case of a tuberculous patient, whose urine contained no albumen, and who was treated with injections of Koch's tuberculin. From the day following the first injection—1 milligramme ($\frac{1}{64}$ grain)—the urine contained 8 grammes (2 drachms) per litre (quart), 20 grammes (5 drachms) in twenty-four hours. At the same time the urine became a dirty

red in color, then diminished in albumen. Seven days later a second injection of 0.0005 grammie ($\frac{1}{130}$ grain) was given. Immediately the amount of albumen increased to 12 grammes (3½ drachms) in twenty-four hours. In forty days the patient had received 0.044 grammie ($\frac{2}{3}$ grain) of tuberculin, and the quantity of albumen eliminated was 406 grammes (13 ounces),—that is, an average of 10 grammes (2½ drachms) daily. Nevertheless, the weight increased during this period, but, unfortunately, the pulmonary trouble was not improved. About eighteen months later, when the patient entered the service of Chauffard, he was in the third stage, the urine continued to be abundant (more than a litre—quart—per day), clear, with a quantity of albumen varying from 18 grammes (4½ drachms) to 4 grammes (1 drachm) in twenty-four hours. A trial of methylene blue increased the amount of albumen to 36 grammes (1½ ounces). There was arterial hypertension, no galop, no symptoms of uremia; toward the end, only, some œdema of the feet, but none of the face. At the autopsy diffuse glomerular nephritis was found, with amyloid degeneration of the glomeruli and of the interlobular arteries; extensive interstitial lesions; flattening of the epithelium of the convoluted tubules, with fusion of the cells; no tuberculosis of the kidneys. Apropos of this case, Chauffard recalls the fact that Grancher and Martin observed nephritis following the injection of attenuated cultures of avian tuberculosis into the rabbit, eight of the animals dying. In one case both kidneys were greatly bleached and smooth; there were present the mixed lesions of glomerular nephritis; the urine contained albumen; the heart was sometimes hypertrophied. Arloing, Roden, and Courmont observed the same lesions in the rabbit after the injection of Koch's tuberculin.

Diagnosis and Complications.—Diculafoy¹⁰ reports six cases in which autopsy showed the presence of Bright's disease, and in which the urine, carefully examined during life, showed at certain times no albumen, although symptoms of uremia were present. These observations, together with similar ones of Lépine, Lancerœux, and others, tend to show that albuminuria is not always a faithful symptom in nephritis, and this fact is proven by the existence of cases of albuminuria in which there is no Bright's disease. In the second part of his communication, Diculafoy points out

certain uræmic symptoms, notably disturbances of hearing, vertigo, dead finger, pruritus, pollakiuria, chilly sensations, cramps in the calves, morning epistaxis, sensation of electric shock, flexuosités of the temporal artery.

The same author ^{June 20} has studied the relation of Bright's disease to other affections. He states, incidentally, that syphilis may lead to a nephritis rebellious to treatment; but he points out more particularly the evolution of Bright's disease in chlorosis, sometimes without albuminuria. He reports several cases of this kind. A milk diet has always been of value in his hands in the treatment of this class of cases.

Lancereaux ¹⁰ _{p.727} believes that the disease, when met with in chlorotics, depends upon an arterial lesion, as shown by Besançon; according to him, patients affected with the two diseases are clearly descendants of gouty arterio-sclerotic ancestors.

Lépine ²¹¹ _{July 9} agrees with Dieulafoy that certain cases of Bright's disease may exceptionally, and sometimes for a rather long period, show no albumen in the urine; but he insists particularly upon the fact that there may sometimes be renal insufficiency without serious renal lesions (and without albuminuria, which is quite natural if there are no lesions of the glomeruli). Too often a case is diagnosed as a contracted or enlarged waxy kidney, when the autopsy shows but slight lesions; the diagnosis should only have been renal insufficiency. He believes that the physician is too much influenced by anatomo-pathological ideas. As an example he cites interstitial myocarditis, which is often wrongly diagnosed, the autopsy showing only degenerative or atrophic lesions of the heart, also sclerosis of the posterior columns, which is often diagnosed unhesitatingly when the symptoms of tabes dorsalis are observed, and yet improvement or often recovery shows that there were no serious anatomical lesions present.

G. Séc., ¹⁰ _{June 27} in reporting two cases of cyclical albuminuria, asks if the cases of nephritis without albuminuria observed by Dieulafoy were not albuminuric at a certain time of the day. He disputes the uræmic symptoms enumerated by Dieulafoy, and believes that the dead finger is a vascular trouble in cardiac disease, or an hysterical phenomenon, and that it has nothing to do with Bright's disease; that the same may be said of diurnal pollakiuria; that cryæsthesia (sensation of cold) may be observed in diabetes.

He believes that the principal sign of renal insufficiency is the toxicity of the urine. The excretion of nitrogen in considerable quantity by the faeces is also a good sign. Séé adds that gout does not lead to nephritis except by arterio-sclerosis, and he insists upon the value of the absorption of the phosphates of milk.

Ernest Kendall¹⁵⁵ _{Oct. '92} reports the extremely interesting case of a sea-captain, suffering from chronic nephritis, who, in his ordinary state, was anaemic, sallow; skin dry; slight oedema of the hands, feet, and ankles; short of breath on exertion, but mentally and physically active. The urine was pale; specific gravity, 1022 to 1015; albumen in small quantity, with hyaline and granular casts. He was, however, subject to attacks marked by the following features: The extremities became cold, the oedema was greatly increased, pulse somewhat accelerated and high in tension, skin absolutely dry, breath urinous; headache intense, bilateral, and often worse in the back of the head and the vertex. The urine passed during the paroxysm was scanty and loaded with albumen. After a variable number of hours of headache, generally shortened by a hot bath, he would fall into a deep sleep, from which it was almost impossible to awaken him; indeed, it seemed more like coma than sleep. It lasted about six hours, and when he awakened he was free from headache. A moderate polyuria would then set in, and in a few days the urine would reach what was its normal condition with him. Occasionally the sleep did not come on so favorably, and he would vomit, the anasarca would increase, the headache become more severe, the breath more urinous. The author concludes that in this case the primary affection was migraine, and that the prognosis was comparatively favorable.

Legendre⁴²⁰ _{Nov. '92} presented a patient of 33 years, in whom for fifteen years there had been partial oedema, localized in the hands and forearms, feet, and malleolar regions, and sometimes in the scrotum. This oedema appeared suddenly, generally symmetrical and indolent, lasting almost always three or four days, and rapidly disappearing. From its firm consistence, slight cyanosis, and heat of the skin, by its rapid and cyclical evolution, it appeared to be of nervous origin; moreover, the patient had the facial expression, the emotivity, and even the hysterical strangulation of a neuro-pathic person.

But what rendered the diagnosis of the case most difficult was

the fact that there were present the symptoms of interstitial nephritis slightly developed, as a small quantity of albumen, intermittent pollakiuria,—often co-existent with the disappearance of the œdema,—cryæsthesia, light *bruit de galop*, and pseudo-neurægic headache. The only disease to which the origin of the nephritis could be attributed was a typhoid fever occurring three years after the appearance of the œdema.

The periodicity, the cyclical progress, the seat of the œdema, which never affected the eyelids or the face, and its long standing did not permit of its being attributed to albuminuria. Neither could it be attributed to rheumatism, for the patient had never shown any manifestations of that nature, as arthropathies, torticollis, lumbago, sciatica, etc. There was a nervous heredity, but not a rheumatic one. The diagnosis was therefore angioneurotic œdema in a nephritic neuropath.

Frederick Roberts¹⁰⁷⁷_{May 24} publishes the case of a man, affected with Bright's disease, who had enormous œdema of the abdominal parietes, with little or no ascites.

Dabney⁶¹_{July 22} gives a good description of the various complications of chronic nephritis: 1. Vascular, or cardiac. 2. Nervous, among which he mentions a case of sweating in a physician. 3. Respiratory. He remarks that the first class of complications are also met with, though less frequently, in parenchymatous nephritis.

Ch. Foote²⁰⁰⁴_{Nov., '92} makes some interesting remarks upon the complications of the disease, especially cardiac. He agrees with Dabney, that these are not limited to interstitial nephritis. He also discusses retinitis in Bright's disease, stating that the duration of life, dating from the discovery of this symptom, is somewhat as follows: 60 per cent. die within the first year; 85 to 90 per cent. at the end of two years; a small percentage living longer than two years.

James Tyson,⁹_{July 8} in a judicious article, speaks of the difficulty of diagnosis in cases where there is a combination of mitral disease with nephritis, quoting several cases; happily, however, an error is of little importance, from a therapeutic point of view; but it is of more importance as regards the prognosis, which is more grave when there exists an organic disease of the heart.

Danforth¹⁰³¹_{Aug.} gives rules for the physician examining for life-insurance. He believes that casts are invariably present when a

true organic lesion exists. Cardio-vascular tension is another symptom almost invariably present in the early stages of renal cirrhosis. Occipital headache, with momentary attacks of vertigo, is rarely absent. In addition to these and specific symptoms, there is usually a somewhat ill-defined, but yet recognizable, appearance of want of perfect health accompanying renal disease, as indicated by restless movements, coated tongue, foul breath, pale lips, and lifeless or waxy appearance of the skin.

Prognosis.—Ralfe² read a paper, before the Medical Society of London, on some clinical features of chronic albuminuria, chiefly with reference to prognosis. He said that the clinical significance of albuminuria as a symptom had undoubtedly diminished during the last twenty years. Cases of "functional" albuminuria constituted from one-half to one-third of all the cases of albuminuria that came under notice. The earlier recognition of symptoms had made the prognosis of albuminuria generally more hopeful. Nearly every case presented itself as showing some variation worthy of notice, as affecting the predisposing or exciting causes that either accelerated or retarded the progress of the disease. The most familiar varieties of chronic albuminuria which came under notice were those which eventuated in the contracted granular kidney, associated with cardio-vascular changes, more or less marked, or the red variety. Owing to the insidious nature of its onset, it was often not till late that the true character of the disease was recognized. When, however, by good fortune, a case was met with in quite an early stage, one might hope, by proper dietetic and hygienic measures, to retard its course. With regard to the nephritis of gouty patients, Ralfe was of the opinion that the intensity and continuance of the inflammation were influenced by the severity of the gouty manifestations, and, when these could be controlled, the renal affection often ran a very chronic course. Symptoms such as uræmia and dropsy had not here the same grave import as in other varieties of chronic albuminuria, and were often relieved by an outbreak of acute gout. A paroxysmal form of chronic nephritis, Ralfe suggested, might be a gouty inflammation of the kidney. He also drew attention to a form of chronic nephritis occurring in middle-aged and obese persons, probably caused by venous plethora. In some of these cases a mild form of diabetes co-existed. The albuminuria so

often found in morphine *habitués* was probably caused by the drug inducing partial paresis of the renal veins and their branches. The author also insisted on the importance of not disregarding intermittent appearances of albumen in middle-aged persons, as these were often a prelude to more serious symptoms. In conclusion, he detailed some observations and experiments made by him on the effect of milk diet on various forms of albuminuria, with the result that an absolute, or nearly absolute, milk diet was most beneficial in acute or subacute nephritis, especially for the relief of dropsy. It was badly borne in advanced cases, especially if there were vascular degeneration or symptoms of uræmia; in one instance the latter followed every attempt to enforce the diet.

In the discussion of this paper, Stephen Mackenzie alluded to the case of a man with granular disease of the kidney and albuminuria, who consulted him many years ago. He was asked whether it would be wise for him to build a residence, but at that early period Mackenzie intimated that it might be best to lease one. Nevertheless, the patient lived twelve years. Another case was under his observation thirteen years, showing what careful diet could do to prolong life. This patient had never eaten meat during that time. Discussing the liability of patients with granular kidney to violent attacks of haematuria, he instanced the case of a man, between 60 and 70 years, who had had several such attacks. He did not attach such importance to albuminoid disease as did Ralfe. He insisted upon the importance of combating the tendency to anaemia, the prognosis remaining good as long as this condition was averted.

F. de Haviland Hall said that the tendency was to underrate the importance of albuminuria in life-assurance. While admitting the possibility of ephemeral and unimportant attacks in adolescents, he regarded the presence of albuminuria in persons over 40 years as very significant. He mentioned that within the last eighteen months three medical friends of his with albuminuria, who had been admitted to assurance, had died, entailing great loss on the respective offices. He concurred in what the author had said in reference to the employment of a milk diet. It was especially when there was scanty urine laden with albumen that it gave good results. The subjects of granular kidney, if properly dieted, might, he admitted, live for years.

Routh pointed out that it was necessary, at any rate in women, to take steps to ascertain that the albumen in the urine was not of extra-vesical origin. One frequent cause of the presence of albumen in the urine of females was haemorrhagic endometritis.

Lauder Brunton commented upon the difference of opinion that prevailed as to the importance, from a life-assurance point of view, of intermittent albuminuria. In one American office the proportion of persons apparently healthy in whose urine albumen was found was given as one in eleven, but in his own experience in not more than 2 per cent. of apparently healthy persons was albumen present. Intermittent albuminuria was thought by some observers to be possessed of but little importance, and a certain number of persons presenting this condition had been admitted to assurance. Inquiry, however, had elicited the fact that the health almost always underwent marked deterioration in the course of a few years; and they had come to the conclusion that albuminuria, even if intermittent, should preclude assurance except at a premium. He pointed out that the presence of albumen in persons over middle age was of exceeding importance. He insisted on the pathological importance of the variety of albuminuria, in which, with a low specific gravity, the quantity of albumen present was so small as only to be perceived with the greatest care. This form was indicative of gout of the kidney, a form in which the disease might advance to such an extent as to threaten the life of the patient, though the merest trace of albumen might be present in the urine. If properly treated with a non-nitrogenous diet and warmth to the surface, these cases might go on for years. Another form of chronic albuminuria of less prognostic importance was that associated with chronic malaria. This was probably due to venous congestion during the attacks of ague.

Norman Kerr said that he saw a great many cases of morphine habit, and he had not found albumen present in the urine in more than 4 per cent. of the cases.

Ralfe did not wish to insist upon the importance of albuminoid disease in the production of albuminuria. If the anaemia became pronounced in cases of chronic albuminuria, the prognosis was certainly gravely affected. Once established, it was astonishing what little effect the administration, even in considerable quantities, of iron produced. The haemorrhage might be due to

two causes,—either to degeneration of the vessels or to congestion, as in malaria. In diabetic patients taking large quantities of morphine he had noticed that the first effect was to raise the blood-pressure, but this was followed by a pronounced fall, with a tendency to congestion. He had, however, not observed the effects following the ingestion of morphine, except in diabetic patients. With reference to the bearing of albuminuria on life-assurance, he suggested that they were still too young to be able to formulate a definite opinion, it being only a few years since patients with albuminuria in any form had been admitted to assurance. He mentioned having seen two cases, in one of which the albumen proved to be due to extensive prostatic disease, and in the other probably to tuberculous mischief. He agreed that special precautions were necessary in the case of female patients.

At the Clinical Society of London, May 26th, Hawkins related the case of a gentleman, aged 49, who had always been in good health before and since, but twenty-five years ago, on wishing to effect an insurance on his life, his application was refused on the ground that his urine contained albumen. Some years later he placed himself under the care of Sir William Gull, and was put on strict diet, but on every occasion his urine was found to contain albumen. He was a spare, wiry man, with a well-developed muscular system, and no abnormality was detected beyond some displacement of the apex of the heart outward. The pulse was regular, and did not exhibit any marked degree of intra-arterial tension. His urine, when seen in January last, was clear and of a dark amber-color, specific gravity 1025. This gave, on standing, a third of albumen. It also contained uric-acid crystals. He had obtained the records of the various examinations made of this patient's urine, and they exhibited a remarkable constancy in respect of the amount of albumen present. He was in the habit of taking much out-door exercise, and felt strong and well, not easily becoming indisposed. Vigorous exercise did not in the least distress him. An even more interesting case was one for which he was indebted to the courtesy of Dr. Russell Dodd. In this case the albuminuria had lasted for forty-three years. The patient was a medical man in large practice, which he relinquished in 1841, after consulting the famous Dr. Bright, who gave it as his opinion that the patient would probably not live two years. The

urine was said at all times to have contained at least one-third of albumen, and this was established on authenticated data since 1874. The specific gravity was never below 1025, and nocturnal micturition had been the rule certainly for eighteen years. In 1887 sugar was detected in the urine in addition to albumen; it persisted for eight months, and then disappeared. He suffered off and on from diarrhoea for some years. The pulse was frequently intermittent, and there was some cardiac hypertrophy, but the sounds, beyond being accentuated at the base, were said to be normal. The patient died of cerebral haemorrhage in 1892, being then 88 years of age, forty-three years after Dr. Bright's gloomy prognosis. He was able to take carriage exercise right up to the day before his death. These two cases seemed to indicate that life might be of ordinary duration even in presence of chronic albuminuria, and also that patients might enjoy, at any rate, fair health. This suggested the question whether there were any means of distinguishing between cases of albuminuria destined to an early death and those in which it would not prove incompatible with a prolonged life. Other cases of the kind had been placed on record by Moxon, Johnson, and others. He had himself never met with a case of persistent albuminuria with the history of a previous attack of acute nephritis from cold, nor was any such case to be met with in the literature of the subject. He inferred from these cases that the amount of albumen in the urine did not afford any indication of the gravity of the disease any more than the presence of hyaline casts. Even cerebral haemorrhage might occur without causing death. It seemed to him that they must go farther than mere symptoms before they could find a basis for prognosis. Of 106 fatal cases of chronic (interstitial) nephritis, 20 died from cerebral haemorrhage, and it was worthy of note that in all these cases both kidneys were diseased, oedema of the extremities not being recorded in a single instance, and oedema of the lungs in only 2, thus showing that all was going on well until the fatal rupture. The remaining cases died from oedema, principally involving the lungs and pleurae. Oedema was, therefore, the most common cause of death, and this occurred in consequence of the stretching of the auriculo-ventricular orifice allowing of regurgitation. One would expect to find a mitral murmur; but, as a matter of fact, this was by no means always present. Arterial sclerosis

was marked in the cases dying from cerebral haemorrhage, and this might account for the non-dilatation of the auriculo-ventricular orifices. Some indication of this condition might be obtained from the alteration in the heart-sounds, which assumed a clanging tone. This he had observed in several instances preceding the fatal result.

Lecorché and Talamon ³¹ _{Oct., '92} report several cases of cyclical intermittent albuminuria, ending, in the course of a certain number of years, in a contracted kidney. They establish several classes: one may be regarded as a sequel of infectious diseases, another pre-gouty, another hereditary. There is no albuminuria of adolescence, but there is a premonitory albuminuria of Bright's disease in adolescence.

Treatment.—Hale White, of London, ² _{Apr. '29} in considering the influence of various diets upon the composition of the urine and the general condition of patients suffering from chronic Bright's disease, pointed out that authors were by no means unanimous as to the best diet for patients with chronic Bright's disease. All the *a priori* reasons which had been urged in favor of milk or any other particular diet were fallacious, and the only way to attack the problem was carefully to observe the condition of the urine and the condition of the patient upon different diets. It was very necessary not to draw deductions from too few cases. The author had therefore taken ten cases of chronic Bright's disease in which the urine had been carefully analyzed every day for many weeks, so that altogether between four hundred and five hundred analyses of it were made. In each case notes were kept also of the general condition of the patient. The following diets were tried: Milk, three pints a day, containing 1076 grains (70 grammes) of proteid. Farinaceous, consisting of bread and milk, containing 1137 grains (74 grammes) of proteid. Full diet, consisting of bread, butter, milk, meat, rice-pudding, and containing 1522 grains (99 grammes) of proteid. Sometimes the effect of adding fish, eggs, or more meat was tried. The following results were reached:—

1. Quantity of urine. Usually more urine was secreted upon farinaceous or milk diets than upon full diet.
2. Specific gravity. The diet had no certain influence on this, but, on the whole, it was lower on milk and farinaceous diets than on full diet.

3. The quantity of albumen passed. The figures showed that nearly always the albumen passed was more upon milk diet than upon farinaceous, and less upon full diet than upon either milk or farinaceous. Even in the rare instances in which the maximum quantity was passed upon full diet, the excess of protein in the full diet more than compensated for any extra loss of albumen; so that patients always best avoided loss of albumen by a full diet.

4. The quantity of urea passed. The influence of diet upon this was most uncertain; often less urea was passed upon full diet than upon farinaceous, and less upon farinaceous than upon milk. Sometimes the reverse was true.

5. General condition of the patient. The cases distinctly showed that a full diet was not more liable to lead to uræmia than any other; in fact, in one patient full diet appeared to ward off uræmia, and the patient ultimately recovered. The patients always felt and seemed much better and stronger on full diet, or on farinaceous diet with meat or eggs added, than on milk or farinaceous only. Many patients loathed milk diet and greatly disliked farinaceous; on the other hand, they relished full diet. The author, therefore, advised full diet, for it did not lead to uræmia; nor was it harmful in any way, but it saved albumen, the patients liked it and improved on it in all respects, while they greatly disliked other diets. If the diuretic effect of milk were desired, plenty of water could be drunk.

R. Quain protested against the indiscriminate use of milk in cases of chronic Bright's disease. He related an instance in which albuminuria was copious and transitory, and followed on errors of diet. He believed that mercury was of the greatest use in some cases of albuminous urine, and he referred to two cases which illustrated its beneficial effects.

Maguire thought that the amount of albumen passed *per diem* was only of relative importance, and a large quantity might be passed by a patient who seemed to preserve perfect health. In the early stage of granular kidney, when there was albuminuria with a full pulse and a laboring heart, full diet was not wise treatment, though later, when the heart was failing, it might be indicated.

Broadbent agreed that the amount of albumen present was

only of value as indicative of other conditions. Observation of pulse-tension and cardiac condition should guide the treatment. The so-called uremic symptoms were in reality due to disturbances of circulation. When these symptoms were threatening, the proper treatment was not low milk diet, but a more liberal regimen, to diminish peripheral resistance and increase cardiac action. He agreed as to the value of mercury, which had a greater effect on arterial tension than the more violent purges.

Bernard O'Connor said that frequency of micturition was diminished with a milk diet. The albuminuria after scarlet fever also lessened if the patients were fed on milk, and he had been told that those who had never eaten meat never suffered from post-scarlatinal albuminuria.

Donkin^{6 May 13} is convinced of the uselessness of prescribing any more strict dietetic rules in cases of chronic Bright's disease, presumably ranking in the "granular" class, than may be indicated by the general symptoms in each individual instance apart from all question of urea excretion. After experience of many cases treated on a full, mixed, or ordinary diet, several of which had previously been long kept, according to usually received principles, on a diet as slightly nitrogenous as possible, he can say confidently, with Hale White, that he has had no occasion to regret the employment of this method, but rather much reason to be more than satisfied therewith. He has never observed any notable diminution in the quantity of urine passed by the patients thus treated, or any increase of albumen; and in some few cases where estimation of the amount of urea was made the results were various, as in Hale White's cases, and seemingly of no clinical importance. In many instances a notable improvement of the general health and a much-diminished tendency to suffer from headache, weariness, and irritability soon followed the substitution of ordinary good living for the theoretically strict diet of the nephrologists; and in more than one case this amendment, with rapidly-receding anaemia, was so striking and immediate (the patients soon resuming and enjoying ordinary or strenuous lives after many months or some years of invalidism and idleness) as to lead to the apparently inevitable conclusion that they had been suffering more from the treatment than from the disease.

With respect to the full-dieting of patients who not only have

the signs and some of the general symptoms of kidney disease, but also are sufferers from dropsy, with much albuminuria and marked oliguria, and, still more, of those who are the subjects of "acute" or "subacute" nephritis, the question is wider and, of course, much more difficult.

C. H. Ralfe⁶ does not agree with Donkin that "nephrologists" are responsible for the too general application of theoretic views. Most writers have pointed out that the cases in which benefit is to be obtained by the exclusive use of milk, or the so-called "milk diet," belong almost exclusively to the recent and acute forms. He had already, with Saundby, shown the disadvantages of milk diet in certain cases.

Lecorché and Talamon³¹ state that milk is excessively used in Bright's disease, and that it leads to anaemia, and they cite several cases in which a resumption of ordinary diet has brought about a marked improvement in the general health of such victims without necessarily causing the diminution or disappearance of the albumen. They reserve the exclusive milk diet for cases of acute nephritis, from whatever cause arising, and for the accidents apt to occur during the course of chronic Bright's disease (*poussées aiguës brightiques*), such as haematuria, uræmia, etc. Even here an average of from a week to a fortnight's milk diet gives all the good one can reasonably expect; a gradual return to a normal, mixed diet should then be begun. During the intervals between these acute attacks they condemn the exclusive use of milk.

Apropos of the feeling against the milk diet, it is to be noted that it is not shared by all practitioners. Davezac¹⁸⁸ has cured a case of chronic nephritis in a man of 42 years, of limited means, ill for four years, and having albuminuria, characteristic, generalized white œdema, ascites, and left pleuritic effusion. Six aspirations were sufficient to entirely evacuate the pleura and one the abdomen. Three litres (quarts) of milk per day, taken persistently, ended in recovery, which has been permanent for several months. The œdema disappeared, the serous cavities dried up, and the urine, which formerly coagulated in mass under 1 drop of nitric acid, contained, at the time of the report, not the slightest trace of albumen.

Lancereaux¹⁰ praises tincture of cantharides, in doses of 8 to 12 drops, and reports a case in which the treatment was suc-

cessful. Da Costa⁶¹ Jan. describes several cases of Bright's disease, interesting from a therapeutic point of view. Stewart⁸⁰ Sept. 15 counsels, in the use of nitro-glycerin for a considerable length of time, to so proportion the dose that the intervals shall be comparatively short,—never less than four times daily, and the amount never more than that just necessary to cause the slightest feeling of fullness in the head or to slightly quicken the pulse. In this way a remarkable tolerance of the drug is obtained.

Grocco²¹¹ p.134 does not attribute any efficacy to gallic acid, fuchsin, or bromide of strontium. Calomel and squills appear to him to be harmful, and the use of iron is abused. Hydrotherapy he regards as useful in certain cases. First among the diuretics he places the acetates of sodium and potassium, and prefers large doses of caffeine to theobromine. The digestive functions should be regulated; iodide, acetate of sodium, caffeine, dry friction of the loins, and trinitrine are his prescriptions in senile insufficiency of the kidneys; and for that supervening on grave disease, especially of an infectious nature, he gives caffeine in large doses or with digitalis, acetate of soda, and oxymel of squill in a diuretic decoction free from excitants, hot baths, cutaneous stimulation, saline purgatives, dry friction of the loins, and milk. The author states that, as in the case of cardiac disease, if there be present physical or mental fatigue, or any cause exciting the functions into greater activity, and the consequent elimination of extractive substances in excess, ptomaines, etc., or if the special local process prevent the proper action of the organ, renal insufficiency readily supervenes.

James Anderson,¹⁰⁷⁷ Jan. 18 in presenting a case of chronic nephritis, stated that he had had a similar case in a syphilitic, in which the symptoms were ameliorated by the use of mercury and iodide of potassium.

URÆMIA.

Talamon³¹ Feb. reports a new case of sweating of urea in a man, 49 years old, who had had several attacks of gout in the great toe, polyuria, and albuminuria for two years; pale, with dilated heart. He suffered from headache and dyspnœa, which suddenly disappeared, giving place to clonic spasms, limited to the upper half of the body and resembling choreic convulsions. The patient spoke with difficulty, owing to the convulsions of the face.

The following night an eclamptic attack supervened, with loss of consciousness, general rigor, the patient biting his lips and tongue severely. Then occurred a continuous hiccough and another spasm; then violent delirium. The face was swollen, but there was no other œdema. The pupils were normal, temperature 37.4° C. (99.4° F.). The following day his condition was the same, with absolute anuria and ecchymotic spots upon the hands and legs. On the ninth day from the beginning of the uræmia coma supervened, with the deposit, upon the sides of the nose, the external auricle and lobe of the ear, of a fine, white dust, as if the skin had been powdered with salt. For two days following the coma continued, with increase of the deposit, which covered the face, the eyebrows, and the hair of the beard. On microscopic examination the deposit was found to consist of small, triangular masses, which, on the addition of a drop of nitric acid, gave crystals of nitrate of urea. On the twelfth day the coma was more profound, and the respiration became of the Cheyne-Stokes type, with a temperature of 37.4° C. (99.4° F.). Death ensued.

Kraus¹¹⁴ states that in anæmic and uræmic conditions the gaseous exchange is not above the normal.

Brunet¹⁸⁸ reports the case of a 43-year-old non-luetic man, who, after an attack of uræmic coma, developed aphasia, left facial paralysis, and right-arm paralysis. On the exterior cerebral surface there was no special lesion other than slightly increased vascularization of the hemispheres. There was a slight depression of the left ascending frontal and parietal convolutions, and no haemorrhagic extravasation. The arteries of the base were not atheromatous, but those of the external face were so in patches. In Brunet's opinion the neurotic symptoms were due not to organic changes, but to an auto-intoxication by toxins retained in the blood of uræmics.

Boinet⁹² discusses uræmic hemiplegia, and relates the case of a man, aged 37 years, with general œdema, much albumen, and hypertrophied heart, who had five attacks of uræmia within a short time of each other. In the first two there was localized convolution, in the third attack hemiplegia followed the one-sided convulsions, and in the fourth and fifth there was hemiplegia alone. The hemiplegia disappeared with the coma. There was

slight hemianæsthesia. There was deafness and amnesia lasting a fortnight after the attack. The patient improved so much that he was able to travel.

Mansell Sympson¹⁵ describes in detail the case of a man of 28 years, suffering from insidious nephritis, which caused no noticeable symptoms until uræmia occurred; at first manifested by a headache, then, a day or two later, by complete amaurosis, with slight deviation of the eyes to the right. The pulse was extremely hard. A subcomatose state followed, with anaesthesia of the left arm and increased conjugate deviation of the eyes to the right. Eclamptic attacks lasting fifteen minutes then occurred, with foaming at the mouth. Pilocarpine was injected, causing abundant sweating. There was no collapse, and the uræmic condition was cured. In this case pilocarpine was of the greatest service.

Richardière¹⁷ Aug. 24 reports an interesting case of uræmic delirium in a child of 11 years, dilatation of the pupils being the only nervous symptom of uræmia. There were anasarca and albuminuria. The temperature was 37.2° C. (99° F.). Death ensued rapidly. No autopsy was held.

Brissaud³ No. 17 describes a case of uræmia with extreme dyspnœa, galloping murmur, ideas of persecution, cataleptic positions, fixed regard, *flexibilitas cerea* of the members, paresis of the face and left upper extremity. Absolute milk diet led to no improvement. At the autopsy the case was found to be one of interstitial nephritis.

Robert A. Reid⁵⁴⁷ Apr. relates two very interesting cases of unusual nephritis following chronic Bright's disease. In the first case, a man of 62 years, the notable features were the absence of the reflexes, vagueness of expression, contracted pupils, and slight drowsiness, which proved to be the incipient stage of coma, in which he died about three days later. In the other case, a man of 65 years, there was Cheyne-Stokes respiration during sleep, and delirium, at first violent, but gradually decreasing in fury, though reason was never fully recovered. The delusion that he was pursued by enemies, who wished to destroy him, prompted most of his violent efforts. A quiet and rather good-natured talkative delirium supervened, generally having reference to traveling and to efforts at returning home.

Rendu²¹² cites a case of convulsive uræmia simulating exactly an epileptic attack, except that the pupils were dilated instead of contracted, and that the temperature was normal. Page²⁰⁸ thinks that, in the treatment of uræmic convulsions, blood-letting should be confined to acute and sthenic cases, if, indeed, it be performed at all. Chloroform will stop convulsions, but it is a dangerous and treacherous drug, and, besides, we are not sure that the convulsions will not return as soon as the chloroform is discontinued. The same is the case with ether. The effects of opium are more lasting than those of chloroform. But opium alone does not meet both immediate indications; it only meets that relating to the irritability of the nerve-centres. It should, therefore, be combined with some other means equivalent to blood-letting, or else given alone in chronic cases, where the blood is thin and poor, the patient feeble, and there is no hope of recovery. For the lesser uræmic symptoms, especially paroxysmal dyspnoea and palpitation, opium judiciously used has no equal.

Pilocarpine has been used in these cases, not so much for its effect on the circulation as with the old idea of eliminating poison by the skin. But it is an exceedingly dangerous cardiac depressant, besides causing such an increased flow of tough saliva as to have produced strangulation. It is doubtful—in fact, very improbable—that it eliminates poison sufficient in a few minutes, or hours, to prevent convulsions. It probably acts beneficially, if, indeed, it does so at all, immediately, by lowering arterial tension. Veratrum viride acts by decreasing arterial tension rather than by eliminating a poison. In other words, it acts like blood-letting without loss of blood. In conjunction with opium, Page has used this drug in uræmic cases, for the past two years, not only without fear, but with uniform success. Morphine should be given hypodermically, and immediately afterward from 5 to 10 minims (0.32 to 0.65 gramme) of veratrum viride in the same way. Brandy should be at hand, in case of any alarming depression. Not only do the convulsions cease, but they do not recur. The pulse may drop from 130 to 20.

Dieulafoy⁴²⁰ treated a case of anuria by subcutaneous injections of renal extract. The patient, a man aged 43 years, presented well-marked uræmic symptoms, with œdema of the lungs and oliguria, which rapidly passed into anuria. Other treatment fail-

ing to produce the least effect, a glycerin-saline extract of the cortical portion of the fresh kidneys, first of guinea-pigs and then of oxen, was prepared according to the method of Brown-Séquard; and after sterilization by filtering, this liquid was injected hypodermatically thrice daily with temporary benefit. The coma passed off, and the kidneys again became active. A relapse occurred, however, after three days of this improved condition, and the patient succumbed.

Renwick Ross ¹_{Dec. 24, '92} and Jaccoud ¹⁴_{Feb. 15} report cases showing the value of blood-letting, Jaccoud stating that it is especially useful in the suffocative form.

Edgar Swindells ⁶_{Aug. 26} attempted venesection in a case of puerperal eclampsia, but the blood was thickened, and would not flow at all. Robert Kirk ⁶_{Sept. 9} believes that this failure was due to the fact that the vein was not sufficiently opened, and he recommends that it be laid bare by a dissection, or that it be opened obliquely nearly half an inch.

Michel ⁴⁵⁴_{July} publishes a case of anasarca caused by retention of urine following urethral stricture.

ABSCESS OF THE KIDNEY.

Valleggi ⁵⁸⁹_{Dec., '92} reports a case of abscess of the kidney, in which the pus, cultures of which were made upon agar-agar and gelatin, showed colonies of the bacillus coli.

AMYLOID DEGENERATION.

Ewald ⁴_{July 10} presented before the Berlin Medical Society preparations from various organs affected with amyloid degeneration, taken from a woman of 50 years, who had suffered from tertiary syphilis. It was to be noted that although most of the organs, including the liver and the spleen, showed, macroscopically, evident signs of amyloid degeneration, the test with iodine and acetic acid succeeded only with the kidney, the intestine, the thyroid gland, and the large vessels of the heart. The aniline tests were also negative in certain organs (liver, spleen, etc.) as regards amyloid degeneration.

J. Coats and Carslaw ²¹³_{June} observed a case of amyloid degeneration of the kidney and intestine, with slight involvement of the liver and spleen, in a patient suffering from prolonged gonorrhœa

and blennorrhagic rheumatism. Coats believes that in this case the degeneration was due to penetration of the blennorrhagic poison into the blood, and that it is to be observed also in syphilis, and in Hodgkin's disease, in which there is no suppuration.

SYPHILIS OF THE KIDNEY.

Grandmaison^{100 July} gives a review of syphilis of the kidney, which may be divided into three classes: (1) gumma; (2) diffuse nephritis; (3) amyloid degeneration. The first is the only class anatomically specific.

Darier¹⁴ gives the details of a microscopical examination in which the lesions showed nothing specific. The patient was a man of 24 years, with a secondary syphilitic eruption and mucous plaques of the mouth. The infection appeared to date back four or five months. The renal symptoms were generalized œdema, intense dyspnoea, headache, digestive disturbance, galloping murmur, and cloudy urine, strongly albuminous. The patient succumbed after about twenty days of illness.

The kidneys, only slightly pale, showed, under the microscope, important lesions, mostly parenchymatous. Groups of uriniferous tubules, numbering from two to five, showed the epithelium detached and completely transformed into a mass of proteic and fatty granulations; in almost all the other tubes the cells were vacuolar and diminished in height; there were some colloid and granular casts; slight inflammation of the glomeruli; absolutely discrete interstitial lesions; slight haemorrhage, with penetration of the blood into the uriniferous tubules. The vessels were healthy. The case was decided to be one of diffuse nephritis with a predominance of parenchymatous lesions, considerable, but only at the beginning of their evolution.

Barthélémy^{100 July} also observed an acute nephritis in a syphilitic patient, who succumbed fifteen days after the appearance of the nephritis, which followed an attack of roseola.

Rasch^{373; 673 Sept; July} found, at the autopsy of a woman 43 years old, who had suffered from tertiary syphilis, a unilateral syphilitic atrophy of the left kidney, which was only seven and a half centimetres long, four centimetres wide, and had only one-third of the volume of the right kidney. The organ was normal in size, but showed signs of beginning atrophy. There was also excessive de-

velopment of the interstitial connective tissue, which was composed partly of fibrils, partly of a homogeneous or fine fibrous tissue, with numerous nuclei. The number of glomeruli was much diminished, and in those remaining the capsule of Bowman was thickened, as were also the arterial walls, the morbid change affecting as well the adventitia as the tunica media.

INJURY OF THE KIDNEY.

Hamel² _{Feb. 18} read, at the Sheffield Medico-Chirurgical Society, a note on a case of ruptured kidney in a woman, aged 22, who had suffered from lead poisoning. She was found alone and unconscious, and it was supposed that she had been the victim of an assault. At the post-mortem examination all the organs were found to be healthy, with the exception of the left kidney, in the middle third of the posterior aspect of which there was a laceration nearly an inch in length, extending in an oblique direction from above downward through the capsule and some little way into the substance of the kidney. There was a considerable quantity of blood extravasated into the surrounding tissues.

Boiffin¹²⁷ _{Apr. 9} communicated to the medical society of Nantes a case of contusion of the right kidney, followed by haematuria and ending in recovery. The patient was a man of 48 years, who was thrown from his carriage to the ground, the carriage falling upon his right side. The immediate pain was very great, but the patient was able to return to his carriage and drive home, a distance of three kilometres. He immediately went to bed, suffering severe lumbar pain and threatened with syncope. The urine was bloody and contained large blood-clots, thick and long. In the afternoon there was great pain, coming on in spasms and extending from the right kidney to the bladder; blood-clots were passed with the urine. The treatment consisted in the application of twelve leeches over the right lumbar region, and poultices of laudanum over the abdomen, which was very sensitive.

In the evening the patient was restless and agitated; the urine was less bloody, and no ecchymoses appeared on the injured region. The abdomen was slightly enlarged. There was intense pain on palpation of the right side, but no deep collection of fluid could be felt. The pain was less acute parallel with the bladder. The pulse was somewhat frequent, but there was no fever. Ice

was applied to the painful parts, and several subcutaneous injections of morphine were made during the night. There were several attacks of pain, and next morning the urine was found to be but slightly tinged with red, and the abdomen but slightly swollen. The right flank was sensitive to pressure, but there was no renal tumefaction nor fever. In the evening there was more abdominal enlargement and sensitiveness to pressure, repeated hiccough, and a temperature of 38.5° C. (101.4° F.).

During the night there was less abdominal and lumbar pain, although the swelling was still marked. The same treatment was followed. For several days the patient improved. Eight days later there was haematuria lasting three days. After that the case went on to recovery, and when seen a year later he complained of no trouble. The author insists upon the advantage of the expectant plan of treatment, and of prolonged repose. According to him, the only indication for opening the renal region is the suppuration evidenced by grave febrile symptoms, and by local symptoms, sometimes but ill-defined. This paper was followed by a discussion on the value of diuretics, Laennec remarking that blood-clots are easily passed by the urine.

Ivanoff¹⁶⁴ June 29 is not in favor of nephrotomy for contusion of the kidney, seeing that it is not a matter of no importance to the patient to have but one kidney. In one case he observed hypertrophy of the heart (!) follow two months after a nephrectomy. In favor of the expectant plan he reports the following case: A girl of 11 years fell from a height of three or four metres. She became pale, experienced pain in the left loin, and fell into syncope. The urine passed three hours later was almost pure blood, the quantity being 600 grammes (19 ounces). The author saw the patient seven hours after the accident. She was lying down, very pale, the pulse scarcely perceptible,—being 136,—the temperature 36.8° C. (98.2° F.). She complained of pain in the left loin, increasing at the least movement. There was a considerable tumefaction in the left hypochondrium, but the limits could not be clearly defined. The color of the skin was unchanged. The abdomen was distended; on the left side, beyond the linea alba, the resonance diminished gradually until at three fingers' distance there was complete dullness, occupying almost the entire half of the abdomen, limited posteriorly by the vertebral column, and

below by the Fallopian arch. There was no injury of the ribs. Palpation was difficult, owing to the pain, but it was possible to locate the most painful point at the kidney. A diagnosis was therefore made of rupture of the left kidney and its capsule. Treatment consisted of repose, an ice-bladder on the left loin, and wine and valerian internally. Toward 5 A.M. the patient passed a large quantity of blood, but more diluted with urine. The treatment was continued for several days, combined with purgatives and injections. There was no change of condition the first six days, an enormous quantity of blood being passed in the urine, and the temperature being high; but after the seventh day there was a slight amelioration, the temperature was lowered, the pulse was stronger and less frequent, the appetite returned, and the urine contained less blood. Improvement continued, and a month after the fall the condition of the patient was very satisfactory; there was no more blood, and the patient began to move about.

The author observed that the quantity of urine passed during and after the illness was normal, proving that the kidney continued to perform its function, at least in part, in spite of the injury.

MOVABLE KIDNEY.

Israel has shown that during respiration a slight displacement of the kidney occurs, that it is an entirely normal phenomenon, and that it may be perceived by palpation. Kuttner believes that it shows a pathological condition of the kidney. T. Hilbert ³²⁶_{v.50,p.483} partakes of the opinion of Israel, and believes that three forms of movable kidney should be distinguished, viz., where the inferior half of the kidney may be perceived, where the entire kidney may be perceived, and where the movements of the kidney may be felt.

Albert Mathieu ¹⁴_{Oct. 23, 192} has observed seven cases in which severe attacks of vomiting occurred, due to movable kidney. Debove and Rendu, in the discussion of these cases before the Société Médicale des Hôpitaux, stated that the same attacks might be seen in women not affected by renal ectopia. I believe that, in order to ascribe to the kidney a pathogenic rôle in the production of vomiting, there must also be a diminution of urine during the attack. In this case there may be present an acute hydronephrosis consecutive to torsion of the ureter.

J. Schmitt ⁵⁹ _{Oct. 22, 1892} has studied the possible relation between movable kidney and diseases of the genito-urinary organs in women. This paper is worthy of consideration.

Depage ⁹⁶⁸ _{Dec. 24, 1892} deprecates the use of the corset, and insists upon the well-known fact that compression of the waist prevents the movement of the posterior portion of the liver in front of the kidney during inspiration.

Sophia Chamney ²⁰¹⁵ thinks that the action of the liver has been exaggerated, and that the predominance of displacements to the right is due not to the presence of the liver on the right side, but to the difference in the development of the mesocolon on the two sides, to the difference also in the structural apparatus for supporting the two kidneys, to the presence of the sigmoid flexure on the left side, and to the frequent existence of peritoneal adhesions and folds near this portion of intestine.

Samuel Ayres ¹⁶¹ _{June} gives a *résumé* of the knowledge on the subject of floating kidney.

Pascale Moscato ⁹⁷⁷ _{p. 310} reports two cases of hydronephrosis following floating kidney.

Gallet, ⁸⁶⁸ _{Dec. 22} in a case of floating kidney, with symptoms, practiced nephropexy, freshening the inferior half of the posterior surface, and suturing it to the internal lip of the wound. In the discussion of this paper before the Royal Society of Brussels, Rommelaere pronounced himself as against the abuse of nephropexy, and expressed the opinion that intestinal troubles are not the result of movable kidney.

SOLID TUMORS OF THE KIDNEY.

Connolly Norman ¹⁶ _{Jan.} read, at the Royal Academy of Medicine, in Ireland, a paper on adenoma of the kidney, exhibiting a specimen in which both the kidneys were cirrhotic, the left extremely so. In the most convex portion of the outer border of the right kidney a solitary tumor projected about half an inch outside the surface of the organ and invaded the cortical substance to about the same depth. It was very distinctly encapsulated. Microscopically it consisted of tubular spaces lined with epithelium approaching generally the cylindrical type, with scanty connective tissue. The epithelial cells were mostly loaded with fat-globules. The speaker alluded at some length to the views of Weichselbaum and

Greenish, Sabourin, and Grawitz on the origin of these growths. He strongly contended that there was no sufficient evidence for the theory of Grawitz (that they develop from displaced embryonic fragments of supra-renal capsular tissue), and he believed that the most satisfactory explanation was that of Sabourin, who held that they originated in the proliferated epithelium of the convoluted tubules.

J. Israel, ⁴¹ before the Berlin Medical Society, discussed the early diagnosis of malignant tumors of the kidney. He said that he had repeatedly pointed out that it was only when a malignant tumor of the kidney was discovered at its very earliest stage that any favorable result could follow operation. To two cases already shown, in which early diagnosis was made and operation performed, he now added a third, that was the earliest discovered and operated on of all known cases of the kind. The kidney shown was from a girl, aged 6 years, who was attacked by haematuria in September of last year, and that had recurred four times. Examination by Nitze's cystoscope showed that the blood came from the kidney. On October 22d the left kidney was found, between expiration and inspiration, to be in a normal position, but on inspiration it descended so low that the lower pole could be grasped and the surface could be felt. No pathological change in the organ could be determined by palpation. Two months later three sorts of change could be made out. The left kidney was somewhat larger than the right; the superficial irregularity of service did not, in the centre of the organ, correspond to the normal; the antero-posterior diameter of the kidney was altered. Later on a corneal resistance could be felt at the hilus, which gave one the impression of an elastic, prominent calyx. The speaker thought himself justified, under the circumstances related, in laying open the kidney, and, if necessary, of removing it. On doing this he found the kidney the seat of malignant disease, although very little enlarged. Section of the diseased portion gave an area equal to the size of a sixpence. Examination showed the disease to be a sarcoma. Recovery ensued.

The same author ⁴² showed, before the Surgical Society of Berlin, a case of malignant struma of the kidney, diagnosed during life, and for which an operation was attempted. He resected the eleventh and twelfth ribs, incised the adipose capsule of the kidney,

and found numerous tumors upon the surface of the kidney, deciding him not to attempt removal, in the event of involvement of the surrounding parts. This, indeed, soon proved to have been the case.

A. Murray²⁸⁴ Mar. reports an instance of sarcoma of the kidney in a man of 60 years. Boinet⁹² Aug. publishes a very interesting case of cystic fibro-sarcoma of the left kidney, with extensive pyonephrosis, in a man of 60 years. There was an enormous fluctuating tumor in the lumbar region. Three punctures were made into this tumor within twenty-seven days, withdrawing each time about 3 litres (quarts) of chocolate-colored pus. Marasmus and death followed. At the autopsy there was found, besides the great pyonephrosis with obliteration of the ureter by the neoplasm, large calculi in the pelvis and calices. The author thinks that, in this case, seeing the integrity of the mucous membrane of the pelvis and calices, the lithiasis must have been consecutive to the tumor.

Welsh³⁶ Feb. read, at the Edinburgh Royal Medical Society, a very interesting communication on the occurrence of leucine and tyrosine in the urine of a case of renal carcinoma. The history of the case commenced with acute rheumatism and alcoholism, but when first it came under observation the malignant growth was the dominant factor. During the week immediately preceding death numerous crystals of leucine and tyrosine appeared in the urine. He endeavored to prove that since, as a result of putrefactive decomposition alone, proteid bodies may give place to leucine and tyrosine, so the appearance of these crystals in the urine of this case marked the commencement of a putrefactive process in a mass of proteid tissue which, to all intents and purposes, was outside the patient's body.

CYSTS OF THE KIDNEY.

Demantké⁷ Mar. presented, before the Société Anatomique of Paris, a case of cystic degeneration of the kidneys and liver. Hamilton⁷² Aug. found the hooklets of the echinococcus in the urine of a young woman who complained of nephritic colic. Careful examination was then made by abdominal palpation, and the kidney was found enlarged to a considerable degree. The patient's general condition did not seem to be affected, and his sole annoying symptom was the recurrent attacks of renal colic.

Examination of the urinary deposit under the microscope showed the hooklets of the echinococci in limited numbers, and on February 4, 1893, at the Rush Medical College clinic, Hamilton cut down upon the kidney by lumbar incision made parallel with last rib. The kidney was exposed and the perinephritic space packed with iodoform gauze, and an incision made directly through the kidney toward the pelvis. The fluid contents of the cyst escaped through the wound, and daughter-cysts, round, white, and shining, rolled out of the incision in great numbers. Irrigation was then practiced, and the parent-cyst, having been entirely emptied of its contents, was flushed with iodine water, and the wound was packed to the bottom with iodoform gauze. The patient was comfortable after the operation, progressed toward a rapid convalescence, and was well in four weeks.

Pollossen²¹ performed lumbar nephrotomy for an hydatid cyst of the kidney, in a woman manifesting symptoms of perinephritic abscess, ready to open in the triangle of Petit. The incision gave issue to phlegmonous pus, and after its evacuation the kidney was seen to be the size of two fists. Later hydatid hooklets were discharged through the fistulous wound, and the urine was purulent. A vertical incision of eight centimetres was made through the fistula, and an horizontal incision of a finger's length above the iliac crest. A large number of hydatid vesicles escaped, and there was found to be a spacious cavity, lined with a fibrous membrane about three millimetres in thickness. This cavity was packed with iodoform gauze. Recovery took place. The author thinks that nephrectomy is indicated before attempting peritoneal operation for tumors in floating kidney, and when there is great alteration of the kidney.

TUBERCULOSIS OF THE KIDNEY.

Donnadiet²², Nov., '92 has endeavored to determine whether the tubercular lesions of the urinary tract are manifestations of an ascending or descending process. Pathological anatomists tend to view the lesion as generally a secondary one in one or other kidney, extending thence downward along the ureter into the bladder,—a mode of occurrence which the author is disposed to accept in connection with acute general tubercular processes. But in the common, cheesy, surgical tubercular lesions the majority of clinicians tend to the idea that

there occurs, as a rule, a primary tubercular focus in the lower urinary or genital structures, which gradually extends upward along the mucous surfaces of the bladder and ureter to the kidney. The author points out that in these cases there is rarely any chance of estimating the relative age of the lesions in the different parts attacked, the process being rarely met in the stage of the gray tubercle, but usually in the form of cheesy masses, or as ulcerations representing the excavations in the mucous membrane due to the removal of such cheesy matter. He quotes 29 reported cases to illustrate how little may be gleaned from autopsy as to the direction of extension in such instances,—21 of these exhibiting the vesical and renal disease co-existing in such a state as to be inseparable, 1 case where both kidneys were normal and the bladder much diseased, 2 cases where the bladder was apparently free from disease when the kidneys were affected, and 5 cases the paucity of notes of which made them unavailable. He reminds the reader, too, that in 1 case, where there were no gross lesions of the bladder, microscopic examination indicated the existence of tuberculosis. Moreover, he quotes Guyon, who in 18 cases encountered 6 showing tubercular cystitis without renal involvement, and who has met but a single instance of a unilateral renal tubercular lesion without other genito-urinary tuberculosis.

Anatomical study being of such indifferent result, Donnadien urges the value of clinical observation in the recognition of the real progress of the process. An examination of a number of clinical reports of cases regarded as examples of urinary tuberculosis indicates clearly that the kidney rarely enters into the clinical aspect until after, and often long after, the vesical symptoms are prominent. In many of the cases the prostatic body and deep urethra are among the earliest to show evidence of involvement; and whether the kidneys are or are not the first portion of the urinary tract to become tubercular, it is certain that they are the last to show symptoms of their diseased state.

Frederick Smith ^{Mar. 15} reports a case of tuberculosis (1) of a kidney; (2) of the corresponding ureter, which was quite impervious, its lumen being filled with caseous material from end to end; (3) of the bladder, which presented a dozen ulcerations of the size of a three-penny piece. The interest of this case lies in the absence of any complaint of bladder pain or noticeable increase in

frequency of micturition; the practical absence of pus from the urine in extensive urinary tuberculosis. The explanation of the first point is not easy to see, though the lesson to be derived from it is very obvious, not to exclude cystic tuberculosis too hastily because pus is not very abundant and complaint of bladder pain is absent; if pus is present even microscopically in a phthisical patient's urine, we must suspect tubercle of the bladder, and where possible it would be well to obtain for our patient a cystoscopic examination. The explanation of the other difficulty was, of course, made very apparent by the impervious condition of the ureter found at the autopsy; its lesson is the same as that of the first point, and the knowledge that such a condition may be present must make us very cautious in prognosis when pyuria is found in a phthisical patient. The difficulties of diagnosis were greater here inasmuch as the kidneys were of normal size.

H. Meunier^{7 Mar.} publishes an illustrated case of tuberculosis of the kidney, bladder, and one ureter, the latter showing a curious disposition; following the destruction of one part of the vesical mucous membrane, the intra-parietal remains of the ureter were isolated and dissected, making a curve in the cavity of the bladder of two centimetres, representing the muscular cylinder (coat) of the urinary passage.

Camargo^{197 Oct., 192} describes a case of hyperplasia with tuberculosis of one kidney following atrophy of the other. The organ, increased in volume, measured 17 centimetres in length, 7 centimetres wide, and 6.5 centimetres in thickness; the size was 310 cubic centimetres, while that of the normal kidney, according to Vierordt, is 149 cubic centimetres. The glomeruli were also increased in diameter, measuring on an average 230 millimetres, the normal average being 200 millimetres. The hyperplastic kidney was at the same time tuberculous, and the author defends the theory that vesical tuberculosis is *almost always*, if not always, *descending*,—i.e., follows the tuberculosis of the kidney,—and that, therefore, surgical interference can be attended by no lasting benefit.

RENAL CALCULUS.

Tuffier^{410 p. 361} recalls the fact that in 1888 he established, by the aid of a series of experiments, the following conclusions: (1) that *aseptic* foreign bodies are not at all modified by their sojourn in

the normal urinary passages; (2) that the organ which contains them (kidney or bladder) undergoes no alteration which can be attributed to the presence of foreign bodies. These results appear to give evidence in favor of the *parasitic* origin of calculi; but the examination of calculi in animals made to ingest oxamide, following the example of Nicolaier and Ebstein, has shown the author that the theory was not well founded; for neither direct examination nor cultures of fragments, taken both from the surface and the interior of the calculi, showed the existence of micro-organisms. The calculi found in the normal urinary passages were observed to have their seat seven times out of eight in the bladder, five times in the pelvis of the kidney, three times in the ureter, and once in the urethra. (The frequent uselessness of artificially-produced calculi in experimental research is to be noted.)

Tuffier has studied the effect of intra-urinary foreign bodies in animals poisoned with oxamide. He is certain that the concretions are more abundant in an infected portion of the urinary apparatus.

Apéry, of Constantinople, in 2500 specimens of urine from various patients, has found sixteen times out of one hundred a sediment containing 6 per cent. of uric acid, 4 per cent. of oxalate of lime, and 6 per cent. of these two bodies united. Phosphatic deposits were exceedingly rare.

Mordhorst¹¹⁶ observes that alkaline waters may dissolve uric-acid calculi, while tophi are much more refractory. He gives the preference to alkaline waters poor in lime, such as Wiesbaden.

Pousson²⁵ publishes a case of anuria due to the presence of a calculus at the mouth of each ureter. The anuria lasted fifteen days and gave rise to no uræmic symptoms except vomiting. Death took place from syncope, at the moment that laparotomy was about to be performed on the right side, which was the seat of pain. At the autopsy the right kidney was found to be much more dilated than the left.

Wylie²⁶ relates the case of a man aged 48 years, who, on January 3d. at 11 P.M., passed urine without noticing anything peculiar. At 4 A.M., January 4th, he tried to do so again, and found he could not. From that time until his death, eleven days afterward, not a drop of urine was secreted. For the first few days he seemed to suffer very little. The skin and bowels were

made to act freely. A fortnight before the commencement of this attack he had suppression of urine for eighteen or twenty hours, and had what appears to have been a slight attack of renal colic. Post-mortem examination twenty hours after death. The left kidney was very much enlarged, weighing $16\frac{1}{2}$ ounces (515 grammes). The ureter was blocked about one inch below the pelvis with a small calculus. There was no trace of a right kidney. Other organs were quite healthy.

HYDRONEPHROSIS.

Tuffier⁷ has succeeded in producing nephritis in the dog by ligating the ureter. The left kidney, after laparotomy, was fixed to the abdominal wall above the umbilicus. A month later the animal was killed, and the kidney found to be globular and fluctuating. The ureter had been ligatured three centimetres above the pelvis of the kidney and was dilated in that portion.

Frumussiane¹⁰ described a case of cancer of the uterus which had caused complete obliteration of the left ureter and almost complete obliteration of the right. The ureter was moderately and the pelvis enormously dilated, the latter forming a large pocket; the kidney itself appeared to be but slightly involved. On the left side, where there was complete obstruction of the ureter, there was almost no hydronephrosis.

Lafarell¹⁸⁸ showed to the Bordeaux Society a case of calculous pyelonephritis, with subhepatic suppurative peritonitis opening into the bronchi, and mistaken for purulent pleurisy.

PYELITIS.

Monti⁵⁷ gives a good description of pyelitis in children. The cause is mechanical, parasitic, or infectious, as may be determined by certain drugs. As to the symptoms, the author gives the following detailed analysis:—

1. Fever in cases of pyelitis may pass unobserved, but, as a rule, the whole is ushered in by a sharp rigor, the temperature elevated, seldom exceeding 38° R. ($\times \frac{9}{4} + 32 = 104^{\circ}$ F.). In consequence, however, the temperature may exceed this limit, but in such cases the character of the fever becomes more remittent in accordance with the congestion. Cases are recorded where the rigors persist for several days at the invasion.

2. Mental aberration in the acute form is not an uncommon symptom, and should be regarded as a suspicious omen; owing to the severe congestion the urea is retained in the blood, and produces the usual phenomena of stupor, delirium, headache, etc.

3. Pain is very frequently absent, but where the origin is due to calculosa this symptom is pronounced. In children the pain is located to the back, passing down to the bladder, and causing the child to make strenuous efforts to urinate; if radiating to the perineal region, defecation or a form of tenesmus may accompany the disorder. In severe cases the pain extends down the thighs, causing the child to draw the knees up over the body and cry with pain and violently screaming to be changed or moved from place to place.

4. Vomiting in the early stage is a common feature of the disease, and is intensified in proportion to the disturbance produced in the secretion of the urine. It is not connected with the diet; the tongue is dry and coated with fur, with great thirst. This symptom is characteristic of pyelitis in children when severe, repeating itself for several days, and usually associated with severe diarrhoea.

5. Urine is the most characteristic symptom in the disease, and requires careful attention, as the diagnosis can be correctly arrived at if due care be exercised in the examination. The first requirement is fresh urine. The greater number pass the normal amount in the twenty-four hours. From the days of Oppolzer it has always been maintained that the quantity of urine passed is increased in chronic pyelitis and diabetes insipidus, which are often acknowledged as pyelitoid in character, but this opinion cannot be extended to children. The reaction is usually acid, but if much pus it may be alkaline; the acid is diagnostic. The specific gravity varies. In pyelitis calculosa, more particularly at the onset, it is high; but in the more chronic cases, which are the most numerous, the specific gravity is lowered, while the quantity passed is slightly increased. The most important ingredient is the amount of pus it contains, which is often considerable, causing the urine to have the appearance of milk, and, when allowed to stand in a glass, will throw down a heavy deposit of pus and mucus, which was the condition presented in these cases.

6. The sediment of pus may be equal to fourth the volume

of urine in bulk, consisting mostly of pus-corpuscles and epithelial cells of the renal pelvis which have processes, and possessing the peculiar arrangement of "roof-tiles." This diagnostic symptom is not without its exceptions. In some severe cases they may be quite absent, in others in very small number, while present in great quantity where no pyelitis exists, having been thrown off from the deeper layers of the bladder, as this epithelial, after a slight change, closely resembles the pus from the renal pelvis. Thus the pus alone in the urine cannot be relied upon, but must be taken in conjunction with the other elements of the secretion. The red blood-corpuscles with bacteria, in fresh urine, would be important testimony. An almost pathognomonic sign is the sudden cessation of pyuria, a consequence of obliteration of the ureter. The other side may sometimes secrete a clear urine, causing an apparent amelioration when there is really grave danger. In calculous pyelitis there is haematuria with sedimentary deposits.

7. Edema of the face is met with in acute pyelitis.

8. In chronic pyelitis there is always great emaciation and sometimes diffuse intra-muscular inflammation. Nephritic colic is also a complication of calculous pyelitis.

The prognosis depends very much on the original cause of the morbid process and the different phases through which it passes. If the pyelitis commence suddenly after an infectious disease, the prognosis may be accepted as favorable; it will probably run its course in a very short space of time and recover, or it may extend over one or two years with a favorable result. Pyelitis arising in the case of haemorrhagic diatheses, as scorbutus, morbus Werlhofii, etc., will be greatly influenced by the course of the primary disease. Pyelitis from retention of urine is usually fatal from uræmia. As a general rule, it may be enunciated that as long as the general condition is good and well sustained the prognosis may be declared as favorable, but as soon as the anuria or pyelo-nephritic condition appears the prognosis is unfavorable. Again, if the course of the pyelitis be accompanied with rapid, marked emaciation, with constant fever, the future prospects may be viewed as grave.

As regards therapeutics, the first element of importance is diet. In the acute form the patient should be kept in bed till the

urine be normal and micturition easy, with milk diet and luke-warm baths; every second day a good rubbing. In the summer months his residence should be at the sea-coast, with lukewarm sea-water baths. In chronic cases the wells of Vichy, Karlsbad, and the different carbonic springs, as Biliner Sauerbrunn, Preblauwasser, Krondorfer, Sauerling, etc., may be found beneficial. In place of those mineral waters, aqua calcis, 2 to 600 grammes ($6\frac{1}{2}$ to 19 ounces) several times a day, may be substituted. In the early stages of acute pyelitis, tannin, alum, and acetate of lead are often found useful; in chronic cases small doses of extract secale conutum have been administered with advantage. The usual course of pyelitis calculosa is complicated with pain, which must be relieved, and the best remedies are narcotia, clysmata, with chloral; small doses of opium, preferably in the form of morphia. In older children morphia injections and baths may be administered with good effect. For the lithiate and oxalate diatheses the alkalies are the best. When depending on retention of urine, emptying the bladder with the catheter and washing the bladder with a weak solution of the acetate of alum. Internally, the acid salts may be given, as nitric acid, tannic acid, etc. When the uræmic phenomena appear, baths, wet sheets, and all the usual train of uræmic medicines may be applied.

CYSTITIS.

Wreden,⁵⁷ basing himself on the fact that the bacterium *coli communis* is the causative factor in cystitis, has endeavored experimentally to produce the disease in the rabbit by means of lesions in the rectum. He found that ulceration of the lower part of the rectum had no influence on the bladder, but that if the lesion was parallel with the prostate, or a little above, cystitis always occurred, and the micro-organisms in the rectum were found in the urine.

Barlow⁵⁹ states that the various forms of cystitis are all of microbial origin, with the exception of that due to cantharides. He classifies them as follows:—

1. Bacillary cystitis produced by (a) the bacillus of tuberculosis; (b) the bacillus coli; (c) the urobacillus liquefaciens septicus (proteus Hauseri); (d) the bacillus ureæ.
2. Cystitis due to cocci: (a) the gonococcus; (b) the staphylo-

coccus pyogenes aureus and albus; (c) the streptococcus pyogenes; (d) the diplococcus pyogenes.

Virulent cultures of these different microbes will cause inflammation of the healthy bladder; but the inflammation is favored (a) by retention; (b) by hyperæmia; (c) by traumatism; the three causes being, moreover, powerless each in itself. Treatment by internal medication is of service only when the urine gives an ammoniacal reaction; beyond this, the only rational measure consists in instillations of nitrate of silver and corrosive sublimate.

Mueller²⁰_{p.129} tries to throw doubt upon the idea that ammoniacal fermentation may be a cause of cystitis, as stated by Rovsing in an important article. He states that the urine is never ammoniacal in tuberculous cystitis. This is not the question. Lépine and Roux, of Lyons,⁹²⁰₉₅ formerly proved, by numerous experiments with the dog and guinea-pig, that the introduction into the urethra of a *pure culture* of the micrococcus ureæ, followed by temporary ligation of the urethra, invariably causes an ammoniacal fermentation of the urine, and cystitis with grave lesions.

Samuel Alexander,²⁴⁵_{July} in an important and beautifully illustrated memoir, studies the pathological anatomy of nodular cystitis. He shows that the lymphoid nodules observed in certain cases of cystitis represent a part of the normal mucous membrane of the bladder; and that in cases of tubercular infection of the bladder the numerous normal lymphoid foci present become enlarged, and as a result of the infection undergo degenerative changes characteristic of tuberculosis.

Southam⁹⁰_{Jan.} states that exfoliative cystitis is especially met with in women as a complication of puerperal cystitis, but is also seen in man, in cystitis of medullary or prostatic origin. The symptoms are those of cystitis, with haematuria and sometimes retention of urine due to the presence of false membrane in the neck of the bladder.

Adami²⁸²_{July} showed preparations from a case of fibrinous cystitis. There were to be seen flattened cells resembling bladder-epithelium. The membranes and membranous shreds were passed after great pain and difficulty. The passage greatly eased the patient. Rare cases have been described as exfoliative cystitis. Thirty or more such cases have been narrated, mostly in women, and in connection with labor or serious uterine troubles. In these, after great pelvic

disturbance, the history given is that of the passage of a more or less complete cast of the interior of the bladder, and upon microscopical examination the cast is found to be composed of a large amount of fibrin, and, incorporated in this, what are evidently the inner layers of the bladder-wall; in many of the cases, not only epithelial layers, but a certain amount of the muscle-tissue of the bladder-wall has thus become exfoliated.

In the case in question a singularly small amount of anything like the element of the mucous membrane of the bladder could be seen imbedded in the fibrin, though there were numerous pus-cells. The case is consequently described as one of "fibrinous cystitis" rather than "exfoliative." True exfoliative cystitis would seem in all cases to be due to a stoppage of the circulation in the vesical walls in consequence of more or less long-continued closure of the vessels by pressure. It is, in fact, a necrosis of the inner layers of the bladder-wall. In this case the condition has been neither so extreme nor has it been of relatively sudden onset. That there has been obstruction of the pelvic veins is shown by the existence of phlegmasia alba of both lower extremities, and to the pressure of the large uterine tumor can be referred the state of the bladder which has rendered the setting up of cystitis a relatively easy matter. That same obstruction of the iliac veins which caused the phlegmasia would affect also the veins of the base of the bladder which pass to the internal iliacs, and Adami suggested that a very possible explanation of this curious condition was to be found in this obstruction, which, leading to a congested condition of the vesical mucous membrane, would lead to exudation, and this, when already there was inflammatory disturbance in the organ, would tend to be of a fibrinous, coagulable nature. But it would seem reasonable, both in phlegmasia alba and in this condition of fibrinous cystitis, to take into account also obstruction to the lymph-flow of the parts.

Wm. Gardner, who had seen the patient with Dougall, gave details of the history of the case, which served to explain the occurrence of the cystitis. The woman from whom the specimen had been taken was suffering from a large myoma, a great part of which was already extruding. The pelvis was nearly filled by this myoma, and in the abdomen could be felt a large smooth mass. The condition of complete filling of the pelvis might account for the

bladder troubles on the lines laid down by Adami. The woman had, in a sense, been in labor for several weeks, her womb trying to extrude the mass; the bladder naturally had been encroached upon and variously disturbed.

Hallé²⁶⁶ _{Nov., '92} describes two forms of perivesical inflammation, which occur in both sexes,—the cicatricial or sclero-adipose (*scléro-adipeuse*) and suppurative. Several clinical cases are described illustrating both varieties. In the former there is an accumulation of fibro-adipose tissue around the base and at the sides of the bladder, which is firmly adherent to the adjacent pelvic organs. Masses of such hard inflammatory tissue, as large as a hen's egg, may be felt around the terminal portions of the ureters; these are of considerable diagnostic value. In the female, where these are essentially the products of cellulitis, they may cause occlusion of the ureter with its serious consequences.

Perivesical abscess usually occurs as a small purulent focus in the midst of a mass of the fibro-adipose tissue before described. The writer believes that this condition is more common than is usually supposed, and reports several cases in which there was no communication between the bladder and the abscess-cavity. The differential diagnosis between perivesical abscess and abscess in the bladder-wall is very difficult except on post-mortem examination.

Von Fritsch³³⁶ _{Nov., '92} reports the case of a man aged 52 years, suffering for a long time from symptoms of suppurative prostatitis, and who was attacked with chills, fever, vomiting, and frequent desire to urinate; the urine, very cloudy and purulent, contained streptococci, as did also the muco-purulent secretions of the prostate. Cultures and experiments showed the streptococcus to be that of Fehleisen.

During the course of this cystitis the patient was attacked with erysipelas of the left thigh, which gradually extended to the right thigh, the back, etc. Cystoscopic examination showed the mucous membrane of the bladder to be inflamed in places, covered with ecchymoses, and puffed up. Recovery took place in four weeks. The author considers this case as one of erysipelas, analogous to erysipelas of the mouth, pharynx, etc.

Filippow⁶⁹⁷ _{'92} reports very favorably the use of iodoform emulsion in chronic cystitis with suppuration. The bladder is first to be

washed out with a $\frac{1}{4}$ -per-cent. solution of lactic acid, followed by from 20 to 40 grammes (5 to 10 drachms) of a 10-per-cent. iodoform emulsion, and allowed to remain for about fifteen minutes, and then drawn off. As high as nineteen injections may be made without danger. In none of the cases treated were any poisonous effects noticed. It is most important to see that the bladder is washed out before injecting the iodoform mixture.

Oskar Blom ⁴⁹⁸_{v.24} reports a case of cystitis in which intra-vesical injections of iodoform and ether with olive-oil were of service. Iodoform 1 part, sulphuric ether and oil each 7 parts, were used, the bladder being previously emptied, and from 1 to 6 cubic centimetres (15 to 90 minims) of the mixture injected every two or three days. The pain caused by the injection lasted but half a minute to a minute, and may be lessened by injecting $\frac{1}{2}$ centimetre ($7\frac{1}{2}$ minims) every two minutes. Luys ²⁹⁹_{May} reports a case from the clinic of Guyon, treated with success by installations of corrosive sublimate, preceded by the installation of cocaine. Corrie ⁸¹_{Sept.} finds chloride of ammonium an excellent remedy in cystitis. He prescribes, ordinarily, a No. 1 capsuleful of Squibb's pulverized purified ammonium chloride, to be taken three or four times in the twenty-four hours, preferably when the stomach is somewhat empty, each dose to be followed immediately by a half-goblet or a goblet of pure cold water.

The following are some of the conditions in which the drug has been given faithful trial, with most satisfactory results in every instance: Cystitis dependent upon stone in the bladder; stricture; hypertrophy of the prostate; deposits of urates, etc.; gonorrhœa (male and female). Cystic irritation from uterine disease or menstrual disorders; malarial effects; masturbation; early pregnancy; simple urethritis (traumatic) in newly-married women. Cystic and renal sequelæ of *la grippe*.

In the majority of cases it was surprising to note the rapidity with which the urine was cleared of bladder-mucus, blood-corpuscles, pus-corpuscles, urates, phosphates, etc., the distressing symptoms disappearing therewith; and in no case did the salt occasion any gastric or other disturbance when taken as ordered. No explanation of the *modus operandi* of the remedy is offered. The capsules are to be filled only as needed for administration, as the salt dissolves the gelatin in a short time.

BACTERIOLOGY, FERMENTATION OF URINE, ETC.

As shown by the researches of Morelli, Krogius, Achard and Jules Renaut, Rodet, and others, the bacilli most frequently found in cases of urinary infection have a remarkable resemblance to the *bacterium coli*. Achard and Renaut, in a new investigation,⁹²⁷ p. 983 have distinguished several types by means of cultures of the microbe in a medium which had already served for the culture of another type. It was noticed that these bacilli in no instance would develop upon media on which they had already been grown, but that some of them could be cultivated upon media which had served for the growth of another bacillus. All positive cultures thus obtained showed a difference in type; it was clear, however, that a negative result did not warrant a conclusion as to their identity. By the aid of these investigations the authors distinguished, besides the principal type, presenting all the features of the *intestinal coli* bacillus, another type presenting the characteristics of the *bacillus lactis aërogenes* (one of the varieties, called the transparent variety of Krogius, resembling greatly the first type). Many other varieties could also be observed, which, from their relative action upon lactose, should be considered as intermediate between the *bacillus coli* and the *bacillus* of Eberth, and comparable to the variety of the *bacillus coli* found in the urine by Rodet and Roux (without action upon lactose or milk), but differing from it in that, unlike the *bacillus* of Rodet and Roux, it did not retain its fermentative action upon lactose in new cultures.

Louis Guinon, of Paris,¹¹⁸ Dec., '92 reports an interesting case of a little girl of 8 years, who was brought into the hospital with well-marked symptoms of typhoid fever. After a rather mild attack, retention of urine occurred during convalescence, necessitating catheterism for four days. Cystitis immediately followed, and seven days later the right kidney became the seat of a pyelitis. There was spontaneous pain over the kidney, excessive sensitiveness of the anterior aspect of the flank, and increase of the fever, which exhibited all the characteristics of a suppurative process. The left kidney was attacked fifteen days later; so that about a month after the onset of the cystitis the whole urinary tract was affected. Benzoate of soda (as much as 75 grains—5 grammes—a day), salol (30 grains—2 grammes), with antipyrin, naphthol,

and lavage of the bladder with boric-acid solution, proved ineffectual, although a mild intoxication was occasioned by the salol. The borate of sodium in dose of 15 grains (1 grammie) in a julep was then given, with completely successful results, after a long course of treatment lasting several months.

The bacteriological examinations, made by Guinon, Achard, and Renaut, showed pure cultures of the *bacterium coli commune*. The microbe was distinguished from the *bacillus of Eberth* and the *bacterium lactis aërogenes* by the fact that it provoked the fermentation of milk, and supplanted upon culture media the *bacterium lactis aërogenes*. Inoculation experiments were also made. Three animals were inoculated by a bouillon culture of the third day. A guinea-pig which received a cubic centimetre ($15\frac{1}{2}$ grains) of this culture within the peritoneum died in thirty-six hours with peritonitis, but a rabbit and a second guinea-pig, which received the same dose, the first in a vein of the ear, and the second in the subcutaneous tissue of the abdomen, both survived, the guinea-pig showing less serious constitutional disturbance.

While Albaran and Hallé, Krogius, Reblaud, and others believe that urine in which the *bacillus coli* is grown becomes ammoniacal by the fermentation of urea, Morelli, Miquel, Achard and J. Renaut, Renault, Barlow, and others believe that it remains acid, and that the urea is not attacked. Hallé and Bissard²⁶⁶ have taken up this question, arriving at the conclusion that ammoniacal transformation of the urea may take place in pure cultures of the *bacillus coli*. They made use, in their investigations, of normal urine sterilized by filtration. Cultures were made in half-filled bowls, where the liquid was brought in contact with the air over a wide surface. They ascribe the contrary results of Achard and Renaut to the fact that they employed urine sterilized at a temperature of 108° C. (227.5° F.),—a temperature which may cause modification of the urine.

Karplus²⁰,_{No. 131, p. 210} observed a case in which the urine, a few hours after excretion, became cloudy and emitted an odor of HS. He claims to have isolated from this a new bacterium which decomposes the neutral sulphur contained in the urine.

James Bays⁶,₁₁ recalls a case of lactic fermentation of the bladder, published by Sir William Roberts,⁶,_{Feb. 1885} in which, after discussing the non-appearance of cystitis in a diabetic patient who

had used a catheter for five years, and the action of the germs of the various ferments in an organic liquid, the author stated that "in a non-saccharine urine the issue of the conflict is always in favor of the ammoniacal ferment, but if the urine be saccharine the issue is always in favor of the acid fermentation. This point was proved experimentally in the laboratory." That the issue is not always in favor of the acid fermentation, and that the results of laboratory experiments are not always verified in the human body, the following case, in the opinion of Bays, will prove : A gentleman of over 80 years of age has been under his care for eight months, suffering from diabetes and having all the symptoms of the disease; great thirst and passing a large quantity of urine of a specific gravity varying from 1030 to 1040, with an acid reaction, and giving a copious precipitate of copper suboxide with Pavy's test-pellets. The patient's condition varied but little, though he became somewhat weaker, and the condition of the urine remained practically the same till the first week in April, when without any obvious reason the urine became turbid, and, on examination, was found to have a highly-offensive ammoniacal odor, was strongly alkaline to blue litmus-paper, and full of a thick, ropy pus; at the same time there was a ready and copious deposit of copper suboxide with the test-pellets. On April 7th Bays stopped the 20 grains (1.3 grammes) of citrate of potash which the patient was taking twice a day, and 20 grains (1.3 grammes) of boric acid were given three times a day. On the 8th the condition of the urine was no better, but on the 9th the urine had become clear and acid again, without the slightest trace of pus. On the 15th it was in the same condition. Arsenic and hydrochloric acid were given, as the patient's appetite was not good, and the boric acid was stopped; but on the 19th the urine was again alkaline, full of pus-corpuscles and crystals of the triple phosphate, highly offensive, and, at the same time, answering to the sugar tests, though not so quickly or with so great a deposit as when the urine was acid. Boric acid was again given, and on April 22d the urine was again acid and free from pus, but contained large quantities of sugar. On the 25th there was no pus, much sugar, and a specific gravity of 1030. From this case it will be evident that glycosuria does not always protect from ammoniacal decomposition in the urine, as the patient had two

distinct attacks of cystitis, with urine so alkaline as to be very ammoniacal when voided, and yet on both occasions the urine at the time was loaded with sugar.

Foster Scott^{16, 17} publishes three new cases of hydrothionuria (sulphuretted hydrogen in urine). The first case was a negress, a primipara, who, three hours after an attack of eclampsia, passed urine intensely acid, and entirely solidified both by the heat and nitric-acid tests. On the following day the odor of the urine and a series of careful chemical tests proved the presence of the gas H_2S ; albumen was present in enormous quantity; there was a heavy deposit of ammonium phosphate, blood-corpuseles, and *active vibrios in the fresh urine*. The bladder was repeatedly washed out with a weak solution of potassium permanganate, and the H_2S soon disappeared. In the second case the patient had undergone laparotomy for a pyosalpinx containing a fetid and blood-stained pus. No trace of albumen was observed either before or after the operation. On the fifth day the reaction was faintly acid, with an odor of H_2S . There were no deposits or bacteria. In this case the appearance of H_2S in the urine may be accounted for in two ways: (1) by a resorption of H_2S from the pus-containing cavity into the blood; (2) by an exosmosis of the gas developed in the pelvic abscess directly through the bladder-wall. The third case was obscure. In resuming, H_2S in the urine may arise either from the decomposition of the sulphuretted substances of the urine, among which albumen is prominent, owing to the facility with which it may be decomposed, or to the presence of the H_2S in some portion of the economy and its passage by the urine. Scott's article is an important one, and worthy of consideration.

PARALYSIS OF THE BLADDER.

James Kennedy¹⁸ reports two cases of atony of the bladder in which, although a catheter was introduced, the urine would not pass except by compression of the hypogastric region. One of the cases was that of a woman on whom trachelorrhaphy and perineorrhaphy had been practiced; in the other case the man was suffering from sciatica. The author thinks that in both cases the reflexes may have been paralyzed. Roads describes a case of paralysis of the bladder in which the intra-vesical injection of a weak solution of perchloride of iron produced good results.

ENURESIS.

Pousson ⁷⁰_{July 23, Aug. 6} states that there are three kinds of enuresis: (1) where there is atony of the vesical sphincter; (2) where the sphincter is normal; (3) where there is contraction of the membranous portion of the urethra. He recommends local application of electricity to the urethro-vesical sphincter in the first class of cases, and even in the others, although its mode of action is not at all clear. Caillag ²⁴_{Jan.} recommends massage of the neck of the bladder, introducing the finger into the rectum.

W. Townshend ⁹⁹_{Dec., '92} publishes an excellent article based upon the personal observation of 100 cases in children. As regards the etiology, these cases were of the following origin: general debility, 17; nephritis, 1; excessive urates, 2; increased acidity, 3; epispadias, 1; small meatus, 2; phimosis, 11; adherent prepuce, 22; vulvitis, 1; masturbation, 1; worms, 6; eczema, 1; recto-polypus, 1; undetermined causes, 31. The frequency of acidity of the urine is worthy of notice.

Choux ³⁶⁰_{Jan.} publishes two cases of enuresis in the adult, and analyzes the influence of the psychological condition of the patient in producing the disease. Simpson ²²⁴_{p. 369} insists upon the difficulty of treating diurnal enuresis. Bissell ⁵⁹_{Dec., '92} publishes a good article on the same subject.

POLYURIA AND DIABETES INSIPIDUS.

Lucas-Championnière ²¹²_{Aug.} reports a case of polyuria, probably hysterical, in the alcoholic son of an alcoholic father. Déjerine ³¹_{July} lectured upon an identical case. Moslé ¹⁴_{Aug.} believes that polyuria sometimes succeeds malarial attacks. Alfred Hand ⁵¹_{Aug.} reports the case of a child suffering from polyuria and presenting tuberculous lesions of the pelvis. The kidney was slightly enlarged. The author does not state whether there was any compression of the ureters.

Monti ⁵⁷_{No. 21} discusses at length the subject of diabetes insipidus in childhood. Lauritzen ³⁷³_{p. 353} observed a case in a girl, 16 years old, who suffered from diabetes insipidus, and who belonged to a family in which the disease was hereditary. By close investigation he ascertained that four generations and eight out of nineteen members of the family had suffered from polyuria, viz., the great-grandmother, three of her children, three grandchildren, and the great-

grandchild.—the patient under his care at the hospital. The disease was in all cases directly inherited by the child from its parent, all the first-born being attacked. Some of these patients suffered also from nocturnal enuresis, but this seemed to be an accidental complication inherited from the great-grandfather, who suffered from enuresis, but not from polyuria.

Lauritzen found that the bladder was considerably distended in many of the cases, one of the patients evacuating 1 litre (2 pints) of urine at one time in his presence. The quantity of urine in twenty-four hours would amount to 13 litres (quarts). In all of the cases in which the urine was examined, it was found to be of a light color, neutral or feebly acid, containing neither sugar nor albumen, and with a specific gravity of 1001 to 1017. The daily excretion of urea was 20 grammes (5 drachms), and therefore not excessive. The patients bore the disease fairly well, one of them living to be 61 years old. (Report of Corr. Editor Levison, Copenhagen.)

Butler¹⁹ reports a case of diabetes insipidus in a man of 73 years, consecutive to moral depression caused by the death of his wife.

URINALYSIS.

The centrifugal method has for some time been employed to produce rapid settling of the sediment of the urine. Jolles¹¹³ No. 2,3,4 is convinced that the sediment thus obtained is not of value as regards quantitative determination. He was unable, after the use of the method, to estimate the phosphoric acid by the deposit formed after adding a mixture of magnesium. The centrifugal method is also of less service in discovering the presence of Koch's bacilli than is the addition to the urine of concentrated carbolic acid.

Frisch⁵⁷ Dec. 22 recommends for the conserving of microscopical preparations of urinary sediment the following mixture: gelatin, 1 part; glycerin, 4 parts; water, 4 parts. This mixture is solid at an ordinary temperature and liquefies under mild heat. It has the advantage over balsams and resins of refracting light to a less degree, and of being soluble in water, which permits of adding it to sediments still mixed with urine.

Senator⁴¹ Jan. 23 showed to the Society for Internal Medicine at

Berlin specimens of urinary sediment colored by Ehrlich's method, showing for the greatest part leucocytes having but one nucleus. These proved to be lymphocytes, and not polynuclear cells or pus-cells, as had been supposed.

Primavera⁵⁹⁶ recommends that examination of the urine should not be made upon a specimen taken at any time, but that the patient be first subjected to an absolute rest, then given a full meal, and the urine examined under both these conditions.

Urea.—Hache⁵⁷⁹ calls attention to the relation existing between the quantity of urine eliminated in twenty-four hours and the quantity of urea excreted within the same period. It is known that in fever the quantity of urine is diminished while that of urea is increased; but that after the period of defervescence there are variations, according to the disease. For instance, in yellow fever, the quantity of urine remains for several days relatively inferior to that of the urea. In telluric fever, on the contrary, the quantity of urine immediately becomes greater than that of the urea, and remains pronouncedly so for several days. The author explains this latter condition by several theories, among which is that a toxin capable of giving rise to polyuria is formed.

Lucas-Championnière recently stated¹⁰⁰ that some surgeons look on diminution of urea in visceral disease as pathognomonic of cancer; but from six years' experience he is of opinion that this is far from being the case, as, where the general health is preserved, the quantity is often nearly normal. Diminution in the amount of urea appears more common in cancer of the ovaries than in any other visceral cancers, the daily amount being sometimes as low as 6 to 5 and even 3 grammes (90, 75, 46 grains). Even with cancer of the ovaries the amount may be nearly normal, which the author has long looked on as a favorable sign from the point of view of an operation. Certain non-malignant diseases of the ovaries—especially ovariitis with small cysts, known as sclero-cystic ovariitis—are accompanied by a diminution in the amount of urea excreted. In such cases it is evidence of a serious cachexia, and if it is desired to perform operations on such subjects with impunity,—as, for instance, removal of the diseased ovaries,—it is necessary, by care, rest, and regimen, first quickly to raise the amount of urea. After major operations the excretion of urea is increased in extraordinary proportions, the maximum being

usually reached on the third, sometimes on the second, day after the operation. It is common to have the amount tripled, and it is often doubled. This is not dependent on the ingesta, but is looked on as a direct consequence of the operation. A healthy kidney is necessary to perform the extra work, and it ought to be aided in its function by all possible measures, especially by the administration of purgatives. The amount of urea diminishes in the course of a few days; and if before the operation it had been low, after recovery the figures are found normal.

Gowland Hopkins⁸¹⁴ believes that the most convenient method of estimating the amount of uric acid in the urine is to saturate the latter with chloride of ammonium, which converts the uric acid and the urates in urate of ammonia. It is then filtered and the uric acid liberated by means of hydrochloric acid, and the quantity estimated by permanganate of potash.

W. Mizerski,⁷⁸³ finding that uric acid precipitates silver from a solution of nitrate of silver and decomposes during this reaction, proposes the following method for determining uric acid in the urine: 50 cubic centimetres ($1\frac{1}{2}$ ounces) of urine are evaporated in a little porcelain bowl, almost to dryness; to the remainder are added 8 to 10 cubic centimetres (2 to $2\frac{1}{2}$ drachms) of hydrochloric acid and 1 to 2 cubic centimetres ($15\frac{1}{2}$ to 31 grains) of alcohol. The sediment precipitated in this way is washed with alcohol (90 per cent.) until the reaction on the chlorine disappears, after which it is dissolved in 5 to 10 cubic centimetres ($1\frac{1}{4}$ to $2\frac{1}{2}$ drachms) of 1-per-cent. solution of carbonate of lithium. The solution obtained in this manner, after filtration, is added to 10 to 15 cubic centimetres ($2\frac{1}{2}$ to $3\frac{1}{2}$ drachms) of the solution of nitrate of silver, mixed with ammonia (1 cubic centimetre— $15\frac{1}{2}$ grains—of solution of nitrate of silver equals 0.01 Ag.).

After precipitation of black sediment, the liquid, after being boiled, is filtered, and the remaining undecomposed part of nitrate of silver is fixed by sulphocyanide of potassium (Volhard's method). (Report of Corr. Editor Drzewiecki, Warsaw.)

Rudel²⁷³ calls attention to the fact that urea has the power of holding in solution uric acid and the urates. A litre (quart) of a 2-per-cent. solution of urea dissolves an average of 0.529 of uric acid. A portion may be precipitated by hydrochloric acid, but a portion remains in solution; if the urea reach 6 per cent.,

the addition of hydrochloric acid produces a precipitate consisting of a combination of a molecule each of uric acid, urea, and water, or one molecule of uric acid, two of urea, and four of water.

Uricæmia.—William Krauss,¹⁷⁰ Nov., '92 in a review of the subject, concludes that, owing to our present imperfect knowledge, it is impossible to define the pathology of the uric-acid diathesis. John Pryor¹⁷⁰ Nov., '92 states that the belief that in this affection the arterial tension is elevated is purely conjecture. The plethoric type, he finds, is rare in Buffalo. It is at times difficult to distinguish the disease from neurasthenia. Herter¹ July, also believes that the pathogenic rôle of uric acid has been greatly exaggerated. Mendelsohn²⁰²³ Apr. does not approve of the treatment in general use. As to mineral waters, they would still retain their place, as dilution of the urine plays a prominent part in the solution of the uric acid. The usual medicinal means had the disadvantage of neutralizing the gastric secretion, and if long continued interfered with digestion. Mendelsohn, therefore, recommended a new remedy, called "urecidine," a synthetic salt, readily soluble in water, only slightly affecting the gastric juice, and which could be taken for a long time without injurious effects. It was curious that the salt did not itself dissolve uric acid. He had ascertained experimentally that the more urine was diluted, *i.e.*, the lower the specific gravity, the more uric acid it was capable of dissolving. It was of value in that it increased the excretion of the urine. By free imbibition of water the acidity of the urine was not only relatively but absolutely diminished. In cases in which no catarrh of the bladder existed it was not so dangerous as is commonly believed, to allow the urine to become alkaline occasionally, although in an ideal method of treatment it should be kept permanently neutral.

Von Mering-Halle agreed with Mendelsohn as to the value of giving large quantities of flesh in the food in the uric-acid diathesis, for the reason that urea was formed thereby in large quantities, this being the best solvent for uric acid.

Wittsack³⁴ July gives the results of the use of piperazin in the uric-acid diathesis, as follow: (1) augmentation of diuresis; (2) diminution of specific gravity and of acidity; (3) no modification of appetite. Piperazin should be administered by the mouth, subcutaneous injection being painful and dangerous. The salts

are preferable, owing to the constancy of their composition. Its use must be continued over a long period.

A. Hermann ⁸⁸ has endeavored to verify the assertion of Colosanti that glycerin dissolves uric-acid calculi, but he believes that it possesses this power only when the uric acid is in the form of gravel, and not in the form of calculi. Its special action consists in determining the presence of polyuria, and in lubricating the urinary mucous membrane. As it is necessary to administer it in large doses, it is only tolerated by patients whose digestion is in good condition; and it also causes slight nephritic colic.

Levison, ⁶⁷³ in a brochure upon the subject of uric acid, refers to the recent work of Horbaczewski, from which it appears that uric acid is formed by the disassimilation of organized albuminous substances, and especially of nucleine; that its excretion is in relation to morbid states, or to medicinal agents which cause a more or less rapid production or destruction of leucocytes; and that it is not notably influenced by alimentation.

The author admits with Roberts that uric acid cannot remain for any length of time in the blood, and that if it is not eliminated it forms crystallized deposits of the biurate in the tissues. He regards as proven that a simple excess of uric-acid production is not sufficient to cause a lasting excess in the blood, but that there must be, besides, a faulty elimination by the kidneys. Levison states that urinary lithiasis is quite common in Denmark, while gout is exceedingly rare.

Oxaluria.—Adler ⁵⁹, does not regard oxaluria as a distinct disease, and believes Cantani to be in error in attributing to it a certain number of nervous systems. In the opinion of Adler, the presence of oxalic acid in the urine is a normal, although not a constant condition, and it is chiefly derived from the food, though a small quantity may arise from want of assimilation. Herter, in the discussion following the reading of this paper, ^{Jan. 29} declined to admit that oxalic acid in the urine was normal, Heitzmann regarded oxaluria as a disease, while Mary Putnam-Jacobi and Weber accepted the views of Adler.

Abeles ⁸ has recently studied oxaluria, chiefly from an experimental point of view. He first examined certain foods, in order to determine the precise amount of oxalates contained in them. He then analyzed the urine of healthy subjects, after ingestion of

food containing abundance of oxalates, and finally conducted a series of investigations on dogs. As a result of his researches, he announces that:—

1. The daily excretion of oxalic acid varies in the healthy human being within the limits assigned by Fürbringer.
2. There is no alimentary oxaluria; that is to say, oxalic acid is not secreted by the kidneys in health, in consequence of the ingestion of food containing oxalates.
3. Oxalate of lime, being insoluble, has no practical significance for the human body when introduced with food. It is quite probable that the soluble oxalates are transformed into lime-salts in the alimentary canal.
4. To occasion the morbid symptom of oxaluria, the ingestion of ordinary food containing oxalates is not sufficient.
5. Transitory oxaluria can be readily produced by the subcutaneous use of small quantities of neutral oxalate of soda.

Abeles also found that the excretion of uric acid was in no way modified by the ingestion of food containing oxalates. He draws the practical conclusion that patients with oxaluria need not have foods containing oxalates excluded from their dietary. The same applies to those with renal affections. It may be well to recall that Fürbringer places the amount of oxalic acid passed in twenty-four hours at about one-third grain (0.02 gramme). Also, that among the foods containing this substance beets, asparagus, tomatoes, and fresh beans occupy a prominent position.

Phosphates.—Freund³⁶⁵_{N.38, 92} proposes a method of determining the proportion of acid phosphates in urine. The total quantity of phosphoric acid being ascertained, chloride of barium is added, when the quantity of phosphoric acid in the filtrate will be represented by the biphosphate. There is but a slight augmentation of this amount at the expense of the phosphoric acid in the state of simple phosphates, the phosphate of barium being slightly soluble. The method is applicable in examining for sugar in the urine.

G. Hoppe-Seyler⁸³_{V.17, p. 63} recommends the following test for sugar: 5.76 grammes ($87\frac{1}{2}$ grains) of nitrophenylpropionic acid are dissolved in 100 cubic centimetres ($3\frac{1}{4}$ ounces) of a 10-per-cent. solution of sodium, bringing the quantity to 1 litre (quart). About 5 cubic centimetres ($1\frac{1}{2}$ drachms) of this mixture are added to 10

drops of the urine, and brought to the boiling-point for one-fourth minute. If the liquid become blue, there is at least 0.5 per cent. of sugar present. One cubic centimetre ($15\frac{1}{2}$ grains) of normal urine gives a green color. Albumen does not change the color of the reagent unless there be at least 2 per cent. present.

As shown in the ANNUAL of 1893 (see article on "Diabetes"), benzosol has been recommended by Piatkowski in the treatment of diabetes. Jolles⁵⁷_{Feb. 26} calls attention to the error which the passage of this drug by the urine may cause in the polarimetric estimation of the sugar. A substance, as yet unknown, is formed by benzosol, deviating to the *left*, thus masking, to a greater or less extent, the deviation to the *right* of the sugar.

Albumen.—Spiegler³¹⁹_{No. 3} advises the following as a method of discovering the slightest traces of albumen: Several drops of acetic acid are added to the urine, which is then filtered. A test-tube is half-filled with the following reagent:—

Bichloride of mercury,	.	.	.	.	.	.	8 parts.
Tartaric acid,	.	.	.	.	.	.	4 parts.
Distilled water,	.	:	:	:	:	.	200 parts.
Glycerin,	.	:	:	:	:	.	20 parts.

The urine is made to pass, drop by drop, along the side of the test-tube. It floats on the surface of the reagent, which has a specific gravity of 1060; and if 1 to 150,000 of albumen be present, a ring will be produced at the point of contact. The reaction does not fail except when iodine is present, in which case a ring is also produced, which might be mistaken for that produced by albumen.

Vas³¹⁹_{No. 43, 92} has studied various albumen tests, in order to compare them, and the result of his researches may be summarized as follows:—

1. The trichloracetic-acid test. To about one-half drachm (2 grammes) of filtered urine 15 drops of a 30-per-cent. solution of trichloracetic acid are added. If albumen is present, a cloudiness occurs, more or less marked, according as more or less albumen is present. This test will detect albumen when not more than 0.002 per cent. is present. According to Vas, the limit for the test by boiling is 0.005 per cent. If the urine be rich in urates, a cloudiness may occur, but this disappears on warming.

2. The sulpho-salicylic test. Vas employed a 20-per-cent.

solution of this substance, of which he added a few drops to the urine. If the albumen present reached 0.002 per cent. in amount, a distinct cloudiness occurred. This test is more delicate than the acetic-acid and ferrocyanide-of-potassium test. The only normal or abnormal substance besides albumen precipitated by sulphosalicylic acid is albumose.

3. The acetic-acid and corrosive-sublimate test. A few drops of a mixture of 1 part of dilute acetic acid with 6 parts of 1-per-cent. solution of mercury perchloride are added to the urine, when a cloudiness occurs if albumen be present. This test only shows albumen when it amounts to 0.06 per cent., and causes a turbidity even when no albumen is present.

4. The acetic-acid and sulphocyanate-of-potassium test. This test solution consists of 100 parts of 10-per-cent. sulphocyanate solution and 10 parts of dilute acetic acid. A turbidity occurs in urine whose albuminous constituents do not exceed 0.004 per cent. This reagent produces no effect on any other urinary constituent.

Vas describes several other tests, but considers them inferior to those described. Of these, he assigns the first place to sulphosalicylic-acid, and the second to the acetic-acid and sulphocyanate test.

Conti⁶⁰¹ states that sulphosalicylic acid precipitates but slightly hemialbumose, and that the cloudiness caused, if the urine contain albumose, is dissipated by heat. It is always to be remembered that if it do not precipitate the phosphates, alkaloids, and resinous substances, it will precipitate the urates if they are in concentrated solution.

Guerin³⁵⁹_{Apr. 1} recommends chromic acid, which precipitates completely the albuminoid matters, both under heat and under cold. The peptones are also precipitated by this agent, but their coagulum is dissolved by the application of heat. To test for albumen, from 5 to 6 cubic centimetres ($1\frac{1}{4}$ to $1\frac{1}{2}$ drachms) of the filtered urine is poured into a tube, and a 1-to-10 solution of chromic acid is added. A white precipitate is obtained, which does not disappear under heat and is not dissolved by concentrated alcohol. This latter removes the opalescent cloudiness which the chromic acid causes in the urine of a patient who has used copaiba balsam, turpentine, tar, and other resinous products. Alexander,⁶⁹_{p. 322} in an

important article, shows that nitric acid is incapable of differentiating albumen from the resinous substances which may be present in the urine.

Zouchlos⁷³ _{Apr. 19} recommends succinic acid, which has the advantage of being solid, and thus more easily carried by the physician. It may be mixed with sulphocyanide of potassium. If these reagents be mixed in equal proportions, and a small portion of the mixture be added to albuminous urine, an immediate cloudiness results with the smallest quantity of albumen. Normal urine gives a negative result. If the pulverized mixture be inclosed in gelatin capsules and the air be excluded, the reaction may be instantly obtained. If exposed to the air, the powder becomes humid.

Millard¹ _{Dec. 24, '92} argues that renal albuminuria exists in the normal state, and calls attention to the difficulty of being able positively to affirm that a trace of albumen does not depend upon a *false* albuminuria.

Bouchard⁵⁵ _{No. 40, '92} enumerates a certain number of albuminurias which do not depend upon a renal lesion: (1) albuminuria caused by excitation of the cutaneous nerves; (2) that observed in obesity, gout, etc.; (3) dyspeptic albuminuria; (4) hepatic albuminuria. All these are intermittent forms.

Tewes³⁶⁶ _{July} reports a case of what he calls *cyclical* albuminuria, observed in a child of 10 years. The albuminuria was entirely absent while the child remained in bed; it appeared upon rising, and presented oscillations, increasing upon violent movements and not upon the ingestion of nitrogenous food; baths had no influence upon it,—a notable fact, since most authors (and recently Washburn⁹ _{Apr. 1}) expressly observed their noxious action.

Crisafullé and Anzalone,⁵⁸⁹ _{p. 225} in testing the urine of albuminuric patients with sulphate of ammonia, have invariably found the serum to be more abundant than the globulin.

Kummer¹⁹⁷ _{Dec. '92} believes that the danger of operation on patients whose kidneys are not healthy consists in the irritant action on the kidneys of certain narcotics and antiseptics. Following the administration of chloroform and ether at the Hôpital Bichât, temporary albuminuria was observed in one-third of the cases of ether narcosis. Other observers in Switzerland conclude that a moderate quantity of ether does not cause albuminuria in a healthy person, but may aggravate it if already present. While moderate use of

narcotics is, therefore, not to be unduly feared in nephritic patients, antiseptics are nearly always to be used in such cases with great caution, and, even in the healthy, should be avoided, if possible, asepsis being substituted. But there is a class of patients in whom albuminuria is cured by operation. Kummer, after citing Olshausen, Pozzi, and Falkenstein in support of this statement, relates a case of his own, of a very large suppurating multilocular ovarian cyst in a middle-aged woman, associated with albuminuria and marked failure of nutrition. After operation the albumen disappeared and the patient recovered her normal health. The author points out that the albuminuria may have been due to (1) obstruction of the ureters by the tumor; (2) compression of the renal blood-vessels; (3) absorption of toxic substances from the suppurating cyst. If due to the last cause, he supposes that the onset of albuminuria would coincide with the febrile manifestations, but he had no information on this point. He concludes that in certain abdominal tumors albuminuria is an indication for operation, which should then be performed aseptically, not antiseptically, and with a minimum narcosis.

Béchamp,¹⁰ v.28,p.932 in his study upon nephrozymase, after having established the existence of this ferment in normal urine, states that its proportion in disease is variable; that there are several albuminurias in the urine of albuminurics; that neither of them is serum-albumen.

Lelion³¹ p.814 insists upon the arthritic origin of the albuminuria of adolescence. Berlin⁸¹ Feb. calls attention to the important fact that urine containing piperazin gives, with picric acid, a deposit absolutely simulating albumen, with the exception that the precipitate formed is not so finely dispersed and more resembles albumen coagulated by boiling. The same specimens tested by nitric acid or any other reagent of albumen did not show its presence.

Goldberg³¹⁹ No.86 has sought to determine the relation of albumen to the number of globules in purulent urine, in order to be able to discern the false albuminuria in cases where there is a co-existence of albumen and purulent deposit. He found that in cases of false albuminuria there were, per cubic millimetre, about 80,000 white globules for 1 gramme ($15\frac{1}{2}$ grains) of dry albumen per litre (quart), while in cases complicated by true albuminuria the number of white globules per cubic millimetre, in proportion to 1 gramme

($15\frac{1}{2}$ grains) of dry albumen, although susceptible of extensive variations, was less than 50,000. It is desirable to examine several specimens of urine, taken at different times. If the proportion of white globules to the albumen varies greatly, it is also to be accepted as a sign of true albuminuria.

Casts.—Aufrech³¹⁹_{No. 22} states that the formation of casts is independent of the albuminuria, since they are the result of irritation and inflammation of the renal epithelium, and not of the transudation of the albumen. This is also the conclusion of Lubarsch⁸⁵⁴_{No. 4} in a recent article upon the subject. Samuel Alexander²⁴⁵_{Feb.} observed, in a young man of 22 years, false nephritic colic, followed by the expulsion from the urethra of fibrinous molds appearing to have been developed in the pelvis and calices.

R. von Jaksch¹¹⁴_{No. 22} observed a case of membranous ureteritis in a woman, in which the urine contained membranous bands as long as ten centimetres, narrow, and some spiral in form. Chemical examination showed them to be formed of fibrin and mucin. The same author, in a (supposed) case of abscess of the kidney, noted the presence of fibrinous masses in the urine.

Senator³¹_{Aug.} explains the spiral form of certain casts by saying that they result from strong compression of a dense, solid mass in a narrow canal. Stengel⁴⁵¹_{Sept.} has studied the cylindroids of the urine; that is, the different formations of various casts observed in the urine by a number of authors. His conclusion is that these formations are the result of a moderate degree of irritation or congestion, that they are met with in albuminuria or independently of it, and that they may, in certain cases, be transformed into true casts. Morris Manges¹_{Feb. 18} reaches the same conclusion in an important study.

Ernst¹³_{Apr. 15} has ascertained the existence of fibrin in the glomerular exudate of inflamed kidney.

Fatty Matters.—Chabrié²⁰⁶_{Feb.} has studied the passage of fat in the urine. He distinguishes several classes, as follow:—

1. The urine contains fats at the same time as albumen, fibrin, and often haematin. Their appearance is white and milky. This is chyluria, which may be due to the presence in the blood of a parasite, the filaria, or else due to a pathological condition. In a case observed by him the urine of the night contained 3.5 grammes ($53\frac{1}{2}$ grains) of fat per litre (quart), that of the day only 0.75

gramme ($11\frac{5}{8}$ grains). Both had the same quantity of urea per litre (18 grammes— $4\frac{3}{4}$ drachms), and much haematin.

2. The urine may present no especial appearance, or may merely have small drops of fat on the surface or in the sediment. It may or may not be albuminous (lipuria). This condition is observed in obesity, in pregnancy, in fatty degeneration of the kidneys, diabetes mellitus, etc.

3. Fat may be observed in the urine in poisoning by carbonic oxide, phosphorus, etc.

4. According to the author, it is met with after ligature of the large intestine in the guinea-pig, in strangulated hernia in man, possibly following biliary resorption (?).

L. d'Amore ⁵⁸⁹_{Sept.} has studied the limit of sensibility of the citro-picric test of Esbach in the presence of certain alkaloids, and gives the figures of the crystals obtained. With salts of cinchonine cloudiness occurred in solutions of 1 to 60000; hydrochlorate of nicotine, 1 to 10000; salts of strychnine, 1 to 18000; cocaine, 1 to 1000; antipyrin, 1 to 1000; atropine, 1 to 400; morphine, 1 to 150.

Acetone.—Engel ¹¹⁴_{No. 29} estimates, with von Jaksch, that the quantity of acetone eliminated daily by the urine is 0.01 in the normal state. Flesh diet may increase it in the proportion of 50 to 1. In a case of diabetes mellitus, under a meat diet, he found an average of 2 to 3 grammes (31 to 46 grains) per day. The addition of bicarbonate of soda to the diet did not modify the quantity of acetone, but the addition of carbohydrates caused it to fall to 1.4 grammes ($21\frac{1}{2}$ grains) per day. Fever in this case had no influence. The appearance of coma caused the acetone to rise to 4.6 grammes ($69\frac{1}{2}$ grains), but shortly before death the quantity fell. In a case of lactosuria the author also observed acetonuria, which disappeared with lactation. In seventeen cases of fever the acetone increased, but not in proportion to the fever. The morbid localization of the influence of acetone, therefore, is largely in diseases of the digestive tube. It is not present to any extent in phthisis. In fine, excess of acetone in the urine is the expression of excessive disassimilation of albumen.

Contejean ⁴¹⁰_{Oct., '92} has endeavored to verify the assertion of Lustig and Oddi, that acetone appears in the urine after extirpation of the celiac plexus, and finds that acetonuria may not depend upon

the extirpation of this nervous matter. It is to be noted that septic peritonitis is avoided with difficulty; he observed acetonuria for three days in a woman operated on for salpingitis; and on the other hand he did not meet with it in a dog which had undergone, under all antiseptic precautions, subdiaphragmatic section of the vagus and extirpation of the ganglia.

Pigments.—Hammartsen⁵⁰⁸ observed, in four insane women, that the urine was of a red color and contained haemato porphyrin. In order to separate it from other coloring matters, the author successfully precipitated it by acetate of barium. One part could be obtained in a crystallized form. These four patients had for a long time taken sulphonal, the relative influence of which upon the production of haemato porphinuria is well known. In the first patient it is notable that the haemato porphyrin did not appear in the urine until nine days after the cessation of sulphonal. Up to that time she had taken 106 grammes ($3\frac{1}{2}$ ounces). Grimm²⁰_{B.122,p.146} has examined the urine for urobilin in normal individuals, and in a large number of patients with and without fever. He found that in the normal state the quantity of urobilin is subject to numerous variations. Its quantity is increased in a great many cases of fever and in some apyretic affections, in cases where there is resorption of the sanguine exudate or destruction of haematin. In persons deprived of nourishment during twenty-four hours the quantity of urobilin is very small or it is altogether absent. It was sometimes absent from the urine in the morning when the last repast had been taken at 10 o'clock the evening before.

Rosin⁵⁵_{Feb. 4} gives the following new reagent for biliary pigment in the urine: Two or three cubic centimetres (31 to 46 minims) of a 10-per-cent. alcoholic solution of tincture of iodine are carefully poured down the side of a test-tube containing the urine to be tested, and held very much inclined. If the urine contain any bile-pigment after a minute or so, a fine green ring appears at the junction of the urine with the reagent which may persist for several hours. If no pigment is present, the reagent destroys the color of the urochrome, with the formation of a pale-yellow or colorless ring at the point of contact.

Keilmann²¹_{Apr. 22, May 24},²² states that indican, in small quantities, is a normal constituent of healthy urine, but under certain circumstances the amount is so large as to merit the designation of indi-

canuria. This condition is usually dependent on decomposition of the intestinal contents consequent on constipation; but it has recently been discovered in the urine in connection with the formation of pus in such quantities as to authorize the belief that its presence may afford an important indication of latent suppuration. The first thing, of course, is to eliminate the intestinal tract as the source of the indicanuria, and this is done by the administration of naphthol, bismuth, or other disinfectant. Should chemical analysis still reveal the persistence of the indicanuria, there is reason to suspect suppuration. In several cases observed by Keilmann the information thus obtained led to a successful search for foci of suppuration, the indicanuria subsiding as soon as the pus was evacuated. The analysis is simple enough to admit of its application by every one, which is more than can be affirmed of many of the tests proposed by laboratory physiologists. Equal quantities of urine and strong hydrochloric acid are shaken together in a test-tube and a little chloroform is added. In the presence of indican this becomes blue from the indigo liberated by the decomposition of the indican and falls to the bottom of the tube. A fair idea can thus be readily obtained of the amount of indican present, but for purposes of diagnosis it is necessary to resort to a quantitative analysis. This does not involve much additional trouble, advantage being taken of the bleaching powers of hypochlorite of calcium, a standardized solution of this salt being dropped into the above mixture until complete decoloration results. Three or four drops of a 5-per-cent. solution may suffice for this purpose, but in some cases as much as fifty, or even eighty, drops may be required.

Fahm²¹⁴ _{Sept. 15} has made a comparative study of indicanuria in fifteen tuberculous and fourteen non-tuberculous children. In the greater number of the tuberculous, indican was increased in the urine in a proportion of 61 per cent., and in the non-tuberculous in a proportion of 40 per cent. Herter¹⁰⁷⁵ _{Jan.} publishes an interesting article upon the importance in pathology of indican in the urine. According to him, it is met with (1) in chronic intestinal dyspepsia, often with clay-colored stools, cephalgia, and mental depression; (2) in neurasthenia caused by sexual excess; (3) in chronic constipation; (4) in epilepsy, especially after the attacks. As to treatment, the author attaches most importance to regulation of

the diet. Nitrogen must be given in a form unfavorable to intestinal putrefaction. In the gravest cases milk should be the only nitrogenous article of food.

Pollak⁶²² publishes the case of a child affected with intestinal tuberculosis and melanuria. The quantity of urine ranged from 100 to 300 cubic centimetres (3½ to 9½ ounces) of varying specific gravity, and a rather alkaline reaction. It contained neither albumen, pus, nor biliary coloring matter. Indican, however, was present either in the fresh urine or in that which had assumed a dark color on contact with air. There were but traces of urobilin, and there was no phenol or diazo reaction. According to Baumann and Brieger, the dark color of urine rich in indican is due to bodies derived from indol and to an advanced state of oxidation.

Toxicity of Urine.—Lenoir¹⁰⁰ gives a complete review of this subject, as does Charrin.²⁰⁸⁶ Nannotti and Baciocchi⁵⁸⁹ have found the toxicity of the urine in patients affected with suppuration to be greater than in the normal state. Ajello and Solaro⁵⁸⁹ studied the toxicity of the urine in Succi, the faster, and found it inferior to the normal during the fasting period. Solaro⁵⁸⁹ states that its toxicity in the child is much less than in the adult.

Voison and Peron⁹⁴ have studied the effects produced by injecting the urine of epileptics into the circulation of guinea-pigs and rabbits. They conclude that the toxic action of the urine excreted before the occurrence of a fit or series of fits is considerably below the normal. This hypotoxicity diminishes in the urine excreted during the period of recurring convulsive attacks. The urinary excretion following a series of fits is hypertoxic if the series be finished, but is not more toxic than normal if more fits are about to occur. Hypotoxicity persists after fits if the latter be followed by maniacal excitement. The urine of epileptics affected with profound mental disorder is constantly hypotoxic, though in these cases there is no departure from the rule that the minimal degree of toxicity is in the preconvulsive period. By estimating the toxicity it often is possible to predict the occurrence of a fit, whether a series has terminated, or whether mental disturbance is likely to supervene. Diminished toxicity of the urine indicates defective elimination of toxins (exciting causes of epileptic phenomena) from the blood. Support to this view is afforded by Chambrelen's recent experiments, which showed that

blood-serum of persons suffering from eclampsia is more toxic during the convulsions, but the urine is hypotoxic at that time. Intestinal antiseptic and avoidance of overeating are some of the therapeutical measures indicated.

Charrin^{927 June} has found that the hypothermic power of the urine in a case of typhus in which the rectal temperature never exceeds 38.4° C. (101.2° F.) is greater than that of a case of the same disease in which the temperature is more elevated. Guinard^{211 July} has estimated the toxicity of the urine of various domestic animals, and arrives at the following classification, starting from the least toxic: Dog, man, pig, ox, guinea-pig, sheep, goat, ass, horse, rabbit, cat. The author thinks that these experiments in comparative physiology may throw some light on the question of uremia. The conclusions he has arrived at confirm the results obtained by chemical analysis. Guinard has also experimented with the urine of other animals, and has found that the bear's comes near to the dog's, whereas the lion's and tiger's resemble the cat's.

Hæmaturia.—Posner^{4 July 10} has observed a case of amœburia. As is known, the presence of amœbæ in the urine is very rare. The patient was a man of 67 years, affected with hæmaturia for three days, ushered in by a chill. Microscopical examination of the urinary sediment showed the presence of amœbæ having about ten times the diameter of the white globules. The patient was put upon a milk diet, improvement following, with return of the hæmaturia several times during the months following. The existence of concomitant albuminuria with casts shows that the kidney or, at least, the calices were invaded by the parasite.

Charles Smith,^{99 July} in a paper on the significance of hæmaturia, insisted that too much value should not be placed upon so-called typical cell-elements in determining, by microscopical examination, the source of the haemorrhage. It is often impossible to distinguish between deep urethral and vaginal cells, between the latter and superficial vesical cells. Transitional cells are often misleading, and the typical caudal cell from the renal pelvis depicted in books is rarely seen. The physician who sends urine for clinical examination is supposed to desire information; for this reason he should give the examiner all facts bearing upon the case. Few do this, and wonder that diagnosis cannot be made

from examination of urine alone. S. W. Pendleton, of Portland, in the discussion, reported cases of haematuria from use of chloral hydrate, from malarial poisoning, and another following *la grippe*. In the latter, coagula in the bladder were prevented by injection of pepsin in dilute hydrochloric acid. S. P. Warren, of Portland, reported a case of haematuria which was checked by simple lavage of the bladder. A few weeks later death occurred, and the cause of hemorrhage proved to be carcinoma of the bladder.

Mitchell Bruce ¹⁰⁷⁷ _{Dec., '92} cites two cases of haematuria in chronic Bright's disease. Robert W. Barton ⁷⁴ _{Oct., '92} states that there is generally no lesion in cases of haematuria due to malaria. His experience is based upon 32 cases, 14 of which were treated before he had any settled views on the etiology or treatment of the disease, with a loss of 50 per cent. The remaining 18 cases were treated, with two deaths, or $11\frac{1}{2}$ per cent. In the fatal cases among the first class, death invariably occurred on the third day of the disease from uræmia, often accompanied by convulsions. The treatment of these cases varied, and consisted of calomel, quinine, and muriatic acid. Fairplay Lloyd ¹⁹⁹ _{Jan.} and Venable ¹⁹⁹ _{July} also counsel the use of calomel in haematuria of malarial origin.

Filatow ²¹ _{May, '95} reports a case of periodical haematuria in a girl of 11 years, who had fallen upon her back. On the eighth day the pain returned, and blood was found in the urine. The pain was marked in the lumbar region, and especially on a level with the coccyx. The urine contained coagulated blood, in the form of a match, in great quantities. The day following pain and blood had disappeared. Two days later haematuria again appeared, lasting two days. After an absence of eleven days, blood again appeared in casts, of the form of the ureter, and lasting four days. At the same time there was pain resembling renal colic. There was then no haematuria for three days, with a re-appearance for four days, absence for eight days, and re-appearance for three days, after which time the urine became normal. Palpation revealed no tumefaction in the renal region; there was no pain on micturition, no fever; the urine was normal in color, but its specific gravity was increased (1017 to 1023). Allowing a sediment to form, urates and uric acid in the form of sand were found in the deposit. Filatow does not believe the case to be of traumatic

origin, since it appeared and disappeared in spite of the complete repose of the patient. Another fact which does not accord with this theory is the sometimes long interval (eleven days) between two attacks of hæmaturia. From the microscopical examination and the form of the coagula, the author believes that the blood came from the pelvic cavity, and that his patient belonged to that class of children subject to all sorts of hæmorrhage, in which case the hæmaturia might be explained as follows: The free uric acid, whose presence could be shown even in fresh urine, and which ordinarily causes no reaction of the urinary mucous membrane, provoked in the patient, in whom these mucous membranes were especially irritable, hæmorrhages which increased or diminished according to the quantity of uric acid. In the discussion, Alexandrow claimed that the case was due to traumatism, and that periodical haemorrhages following injury were by no means rare.

Reliquet¹⁵² reported a case in which much blood was passed in clots, with at times retention of urine. It was finally necessary to aspirate the bladder, as the clots prevented the passage of a catheter. Rectal suppositories of iodoform and hyoscyamus were given. Haemorrhage recommenced the second day after. Internal haemostatics were tried, but gave only temporary relief. A rectal injection was then given containing a little laudanum, after which the blood almost immediately ceased to flow. A hollow sound was left in position and the urine was allowed to escape, at first quite frequently, later only every two or three hours. All symptoms disappeared gradually, and normal micturition returned. Five days later there was retention, but rectal examination discovered a hard, faecal mass, the removal of which led to free and painless micturition, without any return of the haemorrhage.

Donnadien⁹⁰ recommends, in cases of vesical hæmaturia, injections into the bladder, after it has been thoroughly cleared of blood, of $\frac{1}{100}$ solution of tannin, which, according to Guyon, is well supported. He regards haemostatics given by the mouth as of little value, except turpentine or, perhaps, gallic acid.

Hæmoglobinuria.—Köster¹¹⁶ reports a case of so-called essential hæmoglobinuria, in a man of 35 years, cured by injections of mercury. André¹⁰⁸⁸ observed a case in a rheumatic woman of 60 years. The urine, the color of Malaga wine, contained hæmoglobin (and probably methæmoglobin) in large quantities, and

some haematin and leucocytes, with mucous casts, but no biliary pigment.

Brunelle¹⁸¹ saw typical attacks of haemoglobinuria produced in a phthisical patient by slight cold. The even temperature of the hospital ward and good nourishment prevented their recurrence, and the patient improved rapidly. He remained free from attacks during the following summer, but was feeble and troubled with frequent attacks of dry cough. In the following winter attacks were provoked by very brief exposure to temperatures below 41° C. (105.8° F.), his cough increased, the symptoms of an acute exacerbation of pulmonary tuberculosis developed, and toward the end of February he died. No micro-organism could be discovered in the blood. The only lesions found were those of pulmonary tuberculosis and very slight changes in the kidneys,—slight dilatation of the tubules and slender bands of connective tissue; the epithelial cells were unaltered. The author believes that congestion of the liver during the attack is an important factor in the production of paroxysmal haemoglobinuria. It is uncertain whether the haemoglobinuria is the consequence of haemoglobinaemia caused by the excessive destruction of red blood-cells in the liver when congested; the theory of the existence of haemoglobinaemia must be first established.

Nash⁶ observed haemoglobinuria in a girl of 16 years, ill four days with pneumonia. The crisis occurred on the seventh day, and at the same time the urine began to clear. On the twelfth day of the pneumonia (eighth of the haemoglobinuria) the urine contained no more coloring matter or albuminuria. Coats²¹³ showed specimens from the case of a woman who had died after having had haemoglobinuria. Post-mortem examination showed, in every part of the body, the bacilli of malignant oedema. During life, and probably associated with the destruction of the red blood-corpuscles, great dyspnoea had been a prominent symptom. Post-mortem the external appearance of the legs was that of oedema, extending upward from the toes, but on handling the swelling was found to be due to emphysema, caused by the development of gas. The kidneys presented little pits on the surface, and these also were brought about by gas-cavities produced by the bacillus. A similar condition was found in the wall of the heart, in the liver, and in the spleen, but the lungs had escaped. On microscopical

examination of the various organs it was seen that each gas-cavity was associated with a colony of the bacillus. Stained sections of the kidney were shown, demonstrating the microbe.

The connection of all this with the condition of the urine was, Coats said, difficult to discover. The bacillus of malignant oedema was anaërobic, and the presence of the red blood-corpuscles usually inhibited its growth during life; but here was a case where the hæmoglobin had been very largely discharged, and perhaps this had given an opportunity for the bacillus of malignant oedema to multiply in the blood during life. The seat of origin seemed to have been in the uterus, the internal surface of which was found diseased.

There were a number of points in the case requiring much consideration, but one view which might at least be suggested was that the bacillus of malignant oedema had been disseminated in the blood during life, and that after death it had formed the colonies and gas-cavities. In connection with this it should be mentioned that the bacillus was abundantly present in the urine removed during life; it would thus seem to have been not entirely a post-mortem growth. The distribution of the colonies in the kidneys also indicated a planting during life, they being situated, to a large extent, in the arteries and glomeruli. The bacillus was a thick, short rod with rounded ends; in specimens taken from the urine the characteristic spore-formation was seen.

Carre⁶⁷ contends that all the salts of quinine are capable, especially when administered in large quantities, of producing a condition of methæmoglobinuria, giving rise, through a renal insufficiency, to hepatic overwork and a consequent biliary poisoning. It is, therefore, prudent always to prescribe the salts of quinine with great caution. For those predisposed to the action of quinine the author advises the co-administration of this drug and bicarbonate of sodium. For the consecutive jaundice, if it should appear, it is best to administer oil of turpentine,—a remedy that the writer recommends in the treatment of the worst cases of icterus.

Haig²⁰⁸⁷ publishes a case of Raynaud's disease with paroxysmal hæmoglobinuria in a child of 6 years. He thinks that in this case both symptoms depended upon excess of uric acid in the blood.

SUPRA-RENAL CAPSULES.

Physiology.—Stadelmann⁸³ has sought, by the aid of precise methods, to determine the presence in the supra-renal capsules of biliary acids,—hippuric and benzoic acids,—but without success. Furari⁴⁰⁹ describes in detail the development of the supra-renal capsules and of the sympathetic. Langlois,¹¹, continuing some researches made with Abelous, has tested the toxicity of the blood of animals deprived of the supra-renal capsules. The dogs stood very well the ablation of one capsule, but soon succumbed when both capsules were removed, rarely surviving longer than forty-eight hours. If defibrinated blood from an animal deprived of both capsules was injected into an animal submitted to the same operation, death was hastened, occurring in eight or ten hours. If one-sixth of the capsules (by weight) were left intact, the animal lived, and a similar injection caused only temporary disturbance,—somniaence and slowness of movements for some hours. The blood of animals deprived of the capsules, injected into normal animals in doses of 80 cubic centimetres ($2\frac{1}{2}$ fluidounces) for a dog weighing 10 kilogrammes (22 pounds), produced no marked symptom.

Hæmorrhage.—Tuley⁵¹ Nov., 192 reports a case of hæmorrhage of the right supra-renal capsule causing death. There was no hæmorrhage elsewhere. The author knows of but one other similar case,—that recorded by Milroy.²⁷

ADDISON'S DISEASE.

Francesco Marino Zuco and Sante Marino Zuco, ¹³ Aug., taking as basis the fact ascertained by one of them (with Dutto) that the normal capsules contain a large quantity of neurine, express the theory that Addison's disease is due to intoxication by neurine. They are at present conducting experiments to elucidate this hypothesis.

Descrozilles¹⁷, Jan., describes a case of Addison's disease in a child of 13 years. At the autopsy the left capsule was found to weigh 15 grammes ($\frac{1}{2}$ ounce), the left 10 grammes ($\frac{1}{3}$ ounce); both were bosselated and contained numerous tubercular nuclei, from the size of a pin's head to that of a lentil. Desnos¹⁰⁰ Oct., 1918 observed a case in a woman of 26 years, the two capsules showing caseous degeneration. Alex. James³⁶ Apr. publishes the case of a man of 52 years,

in which there was considerable pigmentation of the skin over the abdomen. Improvement took place in this case. Another instance of slow evolution, with remissions, was observed at the clinic of Jaccoud. ⁵⁵ _{Aug. 19}

Roux ²¹¹ _{Feb. 26} cites a case in which death took place after three days of semicomia with lowered temperature, which was 32.5° C. (90.5° F.) four hours before death. There was generalized tuberculosis, with apparent integrity of the supra-renal capsules; the left semilunar ganglion was so bound up in adhesions that it was impossible to remove it. This case favors the now general opinion, well defended by Thompson, of New York, ⁹⁹ _{Aug. 17}, that Addison's disease is a condition arising from and dependent upon irritation of the abdominal sympathetic nerves through lesions of themselves or of their ganglia.

Reiche ⁸⁵⁴ _{B.A.H.I.} describes a case of primary carcinoma of the trachea in which secondary deposits were found in the left supra-renal capsule, and the symptoms of Addison's disease developed and continued well marked until death occurred as a result of purulent bronchitis. The skin pigmentation was already pronounced when adynamic, anaemic, and gastro-enteritic symptoms appeared. The necropsy revealed, in addition to the primary growth—situated in the wall of the trachea at the bifurcation of the tube—and secondarily-affected lymph-glands, a carcinomatous growth in place of the left supra-renal body. A round mass, the size of a cherry, was all that remained of that organ. The right supra-renal and all other organs were free from carcinoma. The right celiac plexus (ganglia and nerves) was free from disease. On the left side the ganglia and the fibres of Remak were normal, but many of the medullated fibres showed degenerative changes. The author calls attention to the uncommon site, both of the primary growth and secondary deposit. The case shows once more that the pigmentation of Addison's disease is not necessarily an expression of a grave lesion of the celiac plexus; also that disease of a supra-renal capsule does not necessarily cause degeneration of the neighboring sympathetic ganglia.

Nicolas Vučetič ²⁸³ _{v. 35, p. 113} reports a case of Addison's disease in a young man of 25 years, who died after vomiting, convulsions, delirium, and elevation of temperature to 39.6° C. (103.2° F.). At the autopsy brown spots of the tracheal mucous membrane were

found in the vicinity of the seventh cartilage. The capsules were tuberculous; the abdominal nerves appeared normal, but the spinal cord in the inferior portion of the dorsal region and above the lumbar region showed lesions of the gray substance and of the posterior sheaths; the posterior roots of certain pairs were as black as graphite. Some of the nervous fibres were atrophied, and there was an increase of the interstitial tissue.

Brault and Perruchet³ observed a case of Addison's disease without lesions of the capsules, but with tuberculosis of the right semilunar ganglion. The patient was a man of 27 years. Many giant-cells and Koch's bacilli were present. Macroscopically the ganglion was normal.

Kolisch and Pichler³¹⁹ studied the nutrition in a patient of 27 years suffering from Addison's disease, finding that this function, as well as the relation between ingestion and excretion, was the same as in a healthy individual.

Abelous, Charrin, and Langlois⁴¹⁰ made a comparative study of the effects of fatigue in a healthy man and in one suffering from Addison's disease. The weight used was 1 kilogramme (2 pounds), the contractions being made two seconds apart. The experiment showed that the diseased individual was far less resistant to fatigue than the healthy one.

GLYCOSURIA AND DIABETES.

NON-DIABETIC GLYCOSURIA.

Toxic Glycosuria.—Garofalo⁴⁸¹ has made experimental researches to determine whether poisoning by carbonic oxide and illuminating gas leads to glycosuria, as claimed by several authors. By means of a mask, he caused animals to inhale a mixture of air and pure carbonic oxide, prepared according to the method of Dumas, or a mixture of air and illuminating gas. The urine was examined by the phenylhydrazin test, but no trace of sugar was found. The author believes that the contrary results obtained by others are due to the fact that the test for sugar was not a sufficiently certain one.

Manchot¹¹⁶ has found that chloral amid causes glycosuria, the more so when the doses are large in size. This glycosuria lasts only for some hours, though it may extend over a period of three

days and a half, and the quantity of sugar may reach 2.2 per cent. In a single case, after 6 grains ($1\frac{1}{2}$ drachms) of chloralamid, these limits were exceeded, the duration being thirty days and the sugar reaching 6.3 per cent. In such cases individual peculiarities form the chief factors.

Alimentary Glycosuria.—Colosanti endeavored without success to produce alimentary glycosuria in several patients affected with cirrhosis, and believes that glycosuria depends more upon the general condition of the patient than upon any defect in the activity of the liver.

Gley⁴¹⁰_{p.420} has observed, as did Falkenberg, that glycosuria follows ablation of the thyroid gland in the dog, but that the condition is only transitory.

Glycosuria in the Puerperal State.—Berberoff⁵⁸⁶_{No.10} has examined 46 women, 9 of whom were pregnant, 25 delivered, and 12 nursing. In pregnancy in the last month no trace of sugar was observed; in 10 women recently delivered the presence of sugar was positively ascertained; in 3 cases but slight traces were found, and in 12 others there was no sugar present. The glycosuria appeared about from three to five days after delivery,—that is to say, during the increased secretion of milk,—disappearing when the secretion diminished. No glycosuria was observed in nursing women. In view of these facts the author concludes that the condition appears only when the secretion of milk is in excess of that required for the child.

G. Zuelzer²⁰³⁸ administered sugar of milk to lying-in women and observed the curious fact that this substance is more easily eliminated in the puerperal than in the normal state. This unexpected fact explains (1) that retention of the milk in the mammary glands may be followed by lactosuria, although the quantity of sugar of milk absorbed may not be great; (2) that the ingestion of a large quantity of sugar by a woman in the puerperal period may be followed by lactosuria. It seems, then, that the tissues take glucose by preference; in which case it is possible that the glucose absorbed by the mammary gland is transformed into lactose.

Glycosuria in Infancy.—Grösz, of Prague,³⁶⁶_{B.34.E.1} comes to the following conclusions: In certain digestive disturbances there is occasionally present, in the urine of infants, a strong reducing agent which gives the qualitative tests for sugar, and which is optically

active but does not ferment (not answering, therefore, to the yeast test). Minute quantities of carbohydrates are also found. Grosz never found glycosuria in healthy, breast-fed infants. When it did occur, there was always some alimentary trouble, most commonly gastro-enteritis. There is often an increase of reducing substances in the urine of infants, in addition to the substance referred to above, which is probably either lactose or some product of it. The limit of assimilation of milk-sugar in infants is very high, being in healthy, breast-fed children about 3.3 grammes (50 grains) per kilogramme (pound) against 1.4 grammes ($21\frac{1}{2}$ grains) in adults. This limit, however, is easily lowered, especially by digestive disturbances, and the glycosuria in such cases is therefore probably due to this lowering of the assimilation limit and partly also to the action of intestinal bacteria.

DIABETES.

Etiology.—Wallach^{69 Aug. 10} has found, from the official lists of Frankfort-on-the-Main, that 171 persons died there from diabetes during a period of nineteen years. Of 156 of these cases in which the religious faith was given, 51 were Jews and 105 belonged to other denominations. The author arrives at the conclusion that the mortality from diabetes is six times as great among Jews as in other religions.

Fisher^{212 July} observed three cases of syphilis and diabetes. The first case was in a man of 40 years, who had syphilis in 1875. In 1891 he became affected with strabismus, disturbance of speech, staggering gait, diabetes, and polyuria. Recovery followed the use of antisyphilitic remedies. In the second case, an old syphilitic, with cephalalgia and diabetes, recovery ensued upon the use of antisyphilitic treatment, antidiabetic remedies having failed. The third case was in a woman suffering from tertiary syphilis, with sugar in the urine. A cure was effected by means of iodide of potassium.

Diabetes in Infancy.—Dufloeq and Dauchez^{92 Ne. 6} report the case of an infant, eighteen months old, always well from birth, but for two weeks constipated, in consequence, it was thought, of the use of sterilized milk, of which immoderate quantities (5 pints— $2\frac{1}{2}$ litres—daily) were taken. Within this time the child had become ill-tempered and depressed, and moaned at night. The urine was

passed in excess. Notwithstanding its good appetite, it had become greatly emaciated. The mother attributed the symptoms to difficult dentition, as two canines were about to make their appearance. There was no vomiting. The abdomen was distended with gas. The pulse was feeble, the face cyanotic. On the day after the first observation the child appeared to go into collapse, and became comatose. For the first time the possibility of diabetes suggested itself, but no urine could be obtained. The child could not be brought out of this condition, and death took place. Examination of a napkin worn disclosed the presence of a sticky powder, which, upon solution and chemical analysis, proved to be glucose.

Conolly⁹⁰¹, July, 74 has recorded a very similar case in a child of 21 months, with marked constipation ending in sudden coma; and instances have been given by Busch,⁹⁷⁵ Mar. 25, 75 Hauner, and Rosebach⁴ at a still earlier age. In the last two cases, however, death resulted from exhaustion rather than coma. Hagenbach relates another case where death came on from pulmonary gangrene in a child of 6 months. There is one case to quote of recovery, in a little baby of Kitselle's, who was found by his father, within a fortnight of his birth, to have diabetes, but who recovered under careful treatment by the time he was eight months old.

H. K. Tavaria¹⁰⁹², July records the case of a Parsee male child, aged 10 months, who was in perfect health previous to a fall from the cradle. When picked up, the child, who was lying on his back on the ground, was found to have no visible marks of injury. He suffered from fever, restlessness, and wakefulness at night, uttering shrill cries at intervals. Urine was passed two or three times an hour, the total amount being large, and containing large quantities of sugar (about one-third). A fortnight after the fall pneumonia set in and the little patient rapidly succumbed.

Diabetes of Nervous Origin.—Ebstein⁴, Oct. 17, 92 reports the case of a mechanic, who, following an application of tampons, had, besides other nervous symptoms, a certain quantity of sugar in the urine (as much as 1.7 per cent.) for some time, together with temporary acetoneuria and diaceturia. The body-weight of the patient diminished.

Pancreatic Diabetes.—Mortimer Rowland², Jan. 7 publishes a case of pancreatic diabetes in a patient aged 57 years. At the autopsy the pancreas was found to be small, hard, and everywhere adher-

ent. Throughout the whole of the gland were hard, nodular masses, having a gritty feel, like minute tubercles. Under the microscope the structure was found to consist mainly of a fibrous net-work, containing in parts degenerated remains of glandular structure. Dotted over the section were gritty, calcareous masses, which were so hard and abundant as to notch the edge of a razor in cutting.

Freyhahn⁴ publishes two new cases of pancreatic diabetes, the first in a much emaciated man of 39 years. At autopsy the pancreas weighed 30 grammes (1 ounce), and the glandular tissue was almost entirely replaced by fat. The pancreatic canal showed considerable sacciform dilatation, and was obstructed by calculi of varying dimensions, consisting almost exclusively of carbonate of lime. In the second case—a marasmic woman—the quantity of sugar had altogether disappeared. At the autopsy, instead of the pancreas, was found a mass of fat and connective tissue, except in the region of the head, in which there were a few glandular lobules. In the pancreatic canal there was a concretion the size of a plum, formed about a hard nucleus, and consisting of carbonate of lime, with an external soft layer partly composed of cholesterin.

Pathogeny.—Hédon⁴¹⁰ has succeeded, following Minkowski, in grafting a portion of the pancreas under the skin of a dog. The duodenal (descending or vertical) portion was used in the experiment, this being separated from the rest of the organ on the level of its union with the head; and as it receives from the artery and superior mesenteric vein an arteriole and vein of sufficiently large size, which penetrate into this portion of the gland at its free extremity, and as it is free from adhesions with the intestine, it is easy to draw it outside of the peritoneal cavity without compromising its vitality, if the vein and arteriole be properly managed, and to fix it under the skin by several catgut sutures, the vascular pedicle passing through the button-hole made in the linea alba. At the end of twenty or thirty days this pedicle, thanks to the new vessels, may be tied, the grafted portion preserving its vitality.

Like Minkowski, the author observed that, if the rest of the organ within the abdomen be extirpated in a dog on whom this graft had been made, glycosuria was not produced; but if the

grafted portion were extirpated, a simple operation in itself, intense glycosuria developed and persisted until death.

Thiroloix⁹²⁷_{Oct. 22} insists that he has observed hypertrophy of the duodenal glands in dogs in which the pancreas had atrophied, as the result of injections of oil into Wirsung's duct. The same author,⁴¹⁰_{Oct.} in a dog which had been submitted to this operation without showing any sugar in the urine for twenty-five days afterward, except during the first two days, when there was a glycosuria of traumatic origin, observed a glycosuria suddenly supervene, at first light, but increasing until 50 grammes (1½ ounces) of sugar were excreted in twenty-four hours, accompanied by all the signs of diabetes. He explains this fact by saying that, under some undetermined influence, the internal secretion becomes insufficient, the external secretion continuing. It is to be noted that each day there could be extracted from the artificial subcutaneous pouch from 15 to 20 cubic centimetres (3½ to 5 fluidrachms) of a clear, transparent liquid, feebly alkaline, and presenting the physiological reactions of pancreatic juice.

Hédon⁴¹⁰_{Jan.} has found, with Minkowski, that dogs rendered diabetic by ablation of the pancreas do not consume glucose given them. If a certain quantity of chemically-pure grape-sugar be introduced by means of the œsophageal sound into the stomach, the ratio of sugar in the urine increases soon after, in proportion to the quantity of sugar ingested. Of cane-sugar but half is utilized, leading to the conclusion that this half is levulose. Diabetic dogs also digest sugar of milk better than glucose; if they have not been subjected to total ablation of the pancreas, they show but slight diabetes, and retain, to a great extent, the power of consuming sugar.

Chauveau and Kaufmann⁹²⁷_{p. 17} have endeavored in several different cases to determine whether the normal equation existing between the quantity of sugar in the arterial blood and that in the venous blood is augmented or diminished. A diminution of this equation was never observed; in other words, the diminution of venous blood in hyperglycæmia, in relation to the arterial blood, is not less than in the normal state. The authors conclude that hyperglycæmia does not depend upon a defect in the absorption of sugar, but upon an increase in its production. They studied the subject (1) consecutive to killing of the animal; (2) after punct-

ure of the floor of the fourth ventricle; (3) after subbulbar section of the cord; (4) after section of the cord parallel with the cervical enlargement; (5) after ablation of the pancreas.

Lépine³ disputes the exactness of these conclusions, since the experiments were made upon the dog fasting, in which state the consumption of sugar is at a minimum. It is not to be concluded in cases in which the consumption of sugar is maximum. He recalls the fact that Hanriot (see ANNUAL, 1893) has proven that if the relation between the CO₂ exhaled and the O inhaled is the same in the diabetic as in the healthy man, this is not the case if both be made to ingest a large quantity of glucose (the same relation for both). In this case the increase in the diabetic is but insignificant, while it is very great in the healthy man. Lépine recognizes, also, that in the conditions of the experiments of Chauveau and Kaufmann there was more a hyperproduction of sugar than a decrease of consumption; but can it be said that traumatic diabetes consecutive to lesions of the nervous system and to ablation of the pancreas is similar to diabetes in man? Lépine again insists on the extreme difficulty of studying glycosuria *in vitro*, there being always a production of sugar at the expense of the peptones of the blood (see ANNUAL, 1893). This is not all; it is necessary, besides, to estimate exactly the glycolytic power of the blood in two given cases, and the respective quantity of sugar contained in each. For instance, if in normal blood having 1 gramme (15½ grains) of sugar per litre (1 quart), at the end of an hour, at a temperature of 39° C. (102.2° F.),—*in vitro*,—there will be lost, say, 0.30 gramme (4½ grains) of sugar; and in diabetic blood, with 2 grammes (31 grains) of sugar per litre (quart), there will be lost, under the same conditions, 0.30 gramme (4½ grains). One would say, naturally, that the loss is the same in both cases; but, according to the researches of Lépine on the blood in glycosuria, if the proportion of sugar is increased in the blood the quantity of sugar destroyed will be, *ipso facto*, augmented.

To summarize, according to Lépine, the diminution of the glycolytic power of the blood, in most diabetes, is a certain fact, and Chauveau and Kaufmann are not justified in saying that hyperglycæmia depends exclusively upon an increase in the production of sugar. The truth lies between the two, and, according

to the cases, there exists more or less diminution of the glycolysis and more or less augmentation in production.

Lépine ⁹²⁷_{Jan. 23} discusses the production of sugar in the body at the expense of blood-peptones (see ANNUAL, 1893). This may be estimated by the ordinary means, as that of fermentation. It takes place in fibrinated or defibrinated blood at all temperatures below 60° C. (140° F.), but the maximum of sugar is not obtained except a little above 55° C. (131° F.), since below this temperature glycolysis occurs, partly obscuring the result. If, instead of peptone, water be added to the blood, sugar is also formed, probably because water causes the production of peptone in the blood. If an organ containing no appreciable amount of glycogen be aseptically removed from an animal, macerated for a certain time in three or four parts of water, and immediately chopped fine at a low temperature, the watery extract will contain but a small quantity of material reducing Fehling's solution, and generally not sugar. If to this watery extract a small proportion of peptone be added, and the temperature be increased to from 56° to 58° C. (133° to 136° F.) for an hour, a certain quantity of sugar is produced, varying according to the organ. The actual production of sugar is proven by the fermentation or phenylhydrazin test. The aqueous or glycerin extract of fresh organs thus contains a ferment which may be called pepto-saccharifying. There is nothing to prove that glycogen is a necessary intermediary between the albuminoid and glucose matters. Lépine and Métroz ⁹²⁷_{Feb. 27} describe in detail the best method of determining, by means of fermentation, the pepto-saccharifying power of organs, and give the numerical results of their experiments. Being altogether technical, their work is not open to analysis.

Chauveau and Kaufmann ⁹²⁷_{p. 29} have found that ablation of the pancreas is not followed by diabetes if the spinal cord be previously cut between the fourth pair of cervical and the sixth pair of dorsal nerves; a procedure which, as Bernard has shown, is followed by hypoglycæmia. From this fact they conclude that there exists, in the cord above the fourth cervical vertebra, a centre of activity for the formation of glycogen in the liver, connection with which is broken by this section. They find that the effects of subbulbar section of the cord are identical with ablation of the pancreas, and believe that there is, in the encephalic portion of the medullary

axis, an excitatory centre for the pancreatic gland, which by its internal secretion would exercise an inhibitory action upon the liver-centre before referred to. If the pancreas be removed before section of the cord is made, however, diabetes occurs, the authors explaining this unexpected result by admitting that the regulatory nervous centres of the hepatic glycogenic function do not act directly upon the liver, but upon the sympathetic ganglia along the nerve-tracks which unite the liver with the cord; these ganglia would form secondary centres, acting directly upon the glandular system by producing sugar, by virtue of an activity derived from the medullary centres.

Hédon ⁹²⁷_{Maz. 20} has succeeded in producing diabetes in the rabbit by injecting olive-oil into Wirsung's duct. According to him, this diabetes presents the following characteristics:—

1. Glycosuria does not follow the operation, but comes on in a month, or even after a longer time; at first slight, it rapidly increases, and attains a very high ratio. It is to be observed that in the period preceding the establishment of the glycosuria sugar is found in the urine on certain days.

2. In spite of the intensity of the glycosuria, the diabetes assumes a light form, in that the glycosuria appears to originate exclusively in the non-utilization of the carbohydrates of the food, which consisted of cabbage and oats. If the latter be suppressed the glycosuria falls to a very low percentage, and it disappears entirely if the animal be made to fast.

3. The animals do not become thin; indeed, some of them increase in weight, thanks to the polyphagia induced by the polyuric glycosuria.

De Dominicis ⁴⁵⁷_{July} maintains (1) that in certain dogs, even when completely deprived of the pancreas, glycosuria may be entirely absent, while polyphagia, polydipsia, polyuria, and more or less azoturia, phosphaturia, and acetonuria may be present in all; (2) that the macroscopic and microscopic lesions are constant and identical in animals without glycosuria, as well as in those with intense glycosuria, among the most important of these lesions being atrophic degeneration of the liver and of the spinal cord; (3) that certain substances, such as saccharin and iodoform, greatly augment the quantity of urine excreted in twenty-four hours (three or four times), without modifying the quantity of sugar, provided

that the diet be not modified, and that salts of copper or carbonate of soda, injected into the veins or under the skin, act in an opposite manner; (4) that after tying Wirsung's duct and separating the pancreas from the duodenum, respecting as much as possible the circulation of the blood, he observed a diabetes in no way differing from that following total ablation of the pancreas. (This experiment appears to have been made but a single time.) In consequence of these researches, the author believes that experimental diabetes, following total ablation of the pancreas, depends upon an intoxication caused by a special substance produced in the intestine by the absence of pancreatic juice, or by an abnormal product, due to a defect in compensatory aliments, and probably by one or the other of these causes. In conclusion, he states that he endeavored to base an hypothesis upon the following experiment: In five dogs suffering from glycosuria, caused by ablation of the pancreas, he removed from the intestine the material which it contained, and, upon the addition of alcohol, obtained a solution of the toxins which he suspected as capable of producing glycosuria. After suitable chemical treatment, he injected these products into the peritoneum of a healthy dog. The urine passed during the forty-eight hours consecutive to the injection contained sugar in the proportion of 2 and 3 per 1000. In repeating this experiment with the intestinal contents of healthy dogs, glycosuria was not manifested.

Hédon⁴⁵⁷ _{Sept.} replies to this author by saying that glycosuria is never absent after extirpation of the pancreas except when the extirpation is incomplete, or when generalized peritonitis supervenes rapidly. In some cases it may fail to appear, but only if the animal is upon a strict meat diet; but it never fails to be produced when the animal eats common bread-paste. Hédon further maintains, in the most energetic manner, that ablation of the head of the pancreas, in such a manner as to prevent all secretion and digestion, is not followed by glycosuria, or is followed only by a temporary glycosuria such as always follows any treatment bearing upon the pancreas, while consecutive extirpation of the tail of the pancreas leads immediately to intense and lasting glycosuria. Shabad⁵⁸⁶ _{Nov. 47, 49; Apr. 8} has confirmed the facts already known, by twenty extirpations of the pancreas. He observed particularly that incomplete ablation caused only diabetes insipidus. Sandmeyer³⁹¹ _{v. 29} extir-

pated the pancreas in twenty-nine dogs, and as a new result he mentions fatty degeneration of the kidneys and of the muscles, sometimes visible macroscopically.

Minkowski²⁷³ v.s.l.p.85 discusses the question of pancreatic diabetes. This diabetes in the dog is *constant* after ablation of the pancreas; it is also produced in the cat and in the pig. Minkowski was not able to produce it in the rabbit or in birds, except occasionally in carnivorous birds. In the dog, which must serve as the type, glycosuria appeared sooner or later in the first hours following the operation, increasing in intensity during the first twenty-four hours. Generally the proportion of sugar the first day did not exceed 1 per cent.; the following day it reached 4.67 per cent., and the third day 8.10 per cent., or more. If the dog received no nourishment, the sugar diminished; but even after seven days of fasting it did not entirely disappear. In a dog of 8 or 10 kilogrammes (16 or 20 pounds), *well nourished*, a daily excretion of 1 to $1\frac{1}{2}$ quarts (litres) of urine was observed, with 10 to 12 per cent. of sugar; that is to say, a proportion of sugar met with in men only in exceptional cases. If aliments containing hydrocarbon be excluded from their diet, the sugar maintains a constant proportion with the nitrogen, the ratio being about 3 to 1, the extreme being 2.62 and 3.05, the average being 2.8 to 1. If sugar be given to the animal, it appears in its entirety in the urine; at least, in many cases. Later, the glycosuria diminishes, owing to an aggravation of the general condition, and more particularly to a default in the production of sugar. It seems, besides, that in badly-nourished animals the sugar is partly utilized. If the pancreas is incompletely extirpated, there is generally no diabetes; yet if the portion remaining be of any size, the urine contains sugar in a more or less noticeable quantity, and there may be a light form of diabetes without glycosuria, unless the animal ingest carbohydrates.

After exposing in detail the results of grafting the pancreas, Minkowski considers the question as to whether the function, the suppression of which causes diabetes, resides in the pancreas. He answers this question in the affirmative, and observes, in addition, that after extirpation of the pancreas the quantity of sugar excreted, in proportion to that of urea, does not correspond to the quantity which, theoretically, should be produced at the expense of the albumen, and which is 113 grammes ($3\frac{3}{4}$ ounces) of sugar

per 100 grammes ($3\frac{1}{2}$ ounces) of albumen destroyed. In phloridzin diabetes the quantity of sugar, in proportion to the nitrogen, corresponds precisely, according to theory. It is possible, therefore, that a considerable part of the sugar produced is consumed in pancreatic diabetes; but, on the other hand, it is possible that in this diabetes the quantity of sugar produced at the expense of a given quantity of albumen is less than in phloridzin diabetes. As regards the various kinds of sugar introduced into the organism of a diabetic dog, the author's experiences show that levulose is utilized to a great extent, a small portion being transformed into grape-sugar and eliminated by the urine,—yet, if given in large quantities, it passes into the urine without modification; that, after the ingestion of cane-sugar, neither cane-sugar nor levulose is found in the urine; and that the excessive excretion of glucose corresponds, as the theory requires, to the half of the cane-sugar ingested; finally, as to sugar of milk, after its ingestion by a diabetic dog, it does not pass into the urine, and the quantity of glucose excreted is increased.

It is known that the glycogen in the liver diminishes in the animal deprived of the pancreas. Minkowski shows that the ingestion of levulose polarizing to the left, by such an animal, produces in the liver glycogen polarizing to the right. This process, in the normal organism, is already understood; but what is curious is, that the ingestion of dextrose by a diabetic dog is not followed by the formation of glycogen in the liver.

Relative to the cause of diabetes in the dog deprived of the pancreas, Minkowski, after reproducing the argument already advanced to destroy the hypothesis of an accumulation of a toxic substance in the blood, admits that a simple increase in the production of sugar does not explain diabetes, and that the pancreas in the normal state has a special function in relation to the destruction of sugar. But he thinks that the glycolytic ferment of Lépine may be disproven; besides, he is not able to advance in its place any other plausible hypothesis. In an appendix, Minkowski insists (1) upon the difficulty of explaining the exaggerated catabolism of hydrogen in dogs deprived of the pancreas; (2) upon the excretion of acetone, diacetic acid, and oxybutyric acid; (3) upon the augmentation of glycogen in the blood; (4) upon the lactic acid in the muscles; (5) upon the influence of morbid con-

ditions upon the glycosuria ; and (6) upon the negative action of jambul in such animals.

Kraus¹¹⁴ has determined the glycolytic power of the blood by estimating the amount of carbonic acid produced. He insists upon individual variations. In seven cases of diabetes he found the *absolute* loss of sugar to be the same as in healthy individuals, and he does not, therefore, believe that diminution of glycolytic power is sufficient to account for the presence of diabetes. (As stated elsewhere, I have never believed that diminution of this function completely explained the pathogenesis of diabetes.)

Lépine and Métroz⁹²⁷ refute the statements of Kraus in proving, by new experiments, the fact already indicated by Lépine (see above), that the quantity of sugar disappeared is not only in proportion to the power of the soluble ferment, but that it depends also upon the quantity of sugar ingested. To two specimens of the same normal blood, each 40 grammes ($1\frac{1}{2}$ ounces), the original quantity of sugar in which has been exactly determined, they added a different proportion of pure glucose. After leaving it one hour at a temperature of 39° C. (102.2° F.) the sugar in the two specimens was measured. Up to a certain limit (greater than the amount of sugar in diabetic blood) it was found, without exception, that the specimen richest in sugar, and which, obviously, contained as much of the glycolytic ferment as the other, had lost the greatest quantity of sugar. The following is the average of five experiments: First specimen, 5.14 grammes ($1\frac{1}{4}$ drachms); second specimen, 6.78 grammes ($1\frac{3}{4}$ drachms); loss of the first, 0.21 gramme ($3\frac{1}{2}$ grains); loss of the second, 0.62 gramme ($9\frac{1}{2}$ grains).—that is, three times more than the first. The conclusion from these experiments is, that the blood of a diabetic certainly does not lose more sugar in an hour than normal blood; and it may be affirmed that its glycolytic power is less, since, considering the excess of sugar that it contains, it should lose much more.

Schenck²⁴⁶ proposes a new method of estimating the sugar in the blood. He takes 50 cubic centimetres ($1\frac{1}{2}$ fluidounces) of blood, adds 50 cubic centimetres ($1\frac{1}{2}$ fluidounces) of water, and mixes this solution with 100 cubic centimetres (3 fluidounces) of a 2-per-cent. solution of hydrochloric acid and 100 cubic centimetres (3 fluidounces) of a 5-per-cent. solution of sublimate. This he filters, passing across through the filter a current of sul-

phuretted hydrogen; in ten minutes the mercury is entirely precipitated. It is again filtered, and the sulphuretted hydrogen is removed from 150 cubic centimetres (4½ fluidounces) of the mixture by a current of air through a tube. It is then neutralized and evaporated to 100 cubic centimetres (3 fluidounces), and the sugar estimated by Knapp's method.

Panormoff,⁸³ v.18,p.590 contrary to the assertion of Cl. Bernard, finds in the muscles glucose in the form of glucosazone, the muscles, contrary to the opinion of Pavy, not containing maltose; in warm-blooded animals the quantity of glucose is small, being greater in cold-blooded animals. It does not augment after death, as in the liver, although the glycogen diminishes progressively in the muscles. It seems to the author that during rigidity a process of fermentation takes place which destroys the sugar as soon as formed; otherwise, seeing the quantity of glycogen which disappears, about 10 grammes (2½ drachms) of glucose would be formed in 1 kilogramme (2 pounds) of muscle in twenty-four hours.

Ouchinsky⁴⁵⁷ publishes a *résumé* of researches made by him upon the gaseous exchange and calorimetric condition of dogs rendered glycosuric by means of phloridzin. With the aid of the respiratory apparatus of Pachoutine and the water calorimeter employed in his laboratory, he was able to carry on observations for several consecutive periods of twenty-four hours, bringing the animals out of the apparatus for a half-hour or an hour each day,—the time required to weigh and feed the animals and change the carbonic-acid condensers and the water eliminated. He found that in dogs which had ingested from 1 to 2 grammes (15½ to 31 grains) of phloridzin the quantity of carbonic acid exhaled and the oxygen inhaled did not vary comparatively with the normal state. The quantity of urea and nitrogen seemed slightly diminished, and the quantity of heat was considerably diminished. The animals became apathetic and somnolent, and, if made to fast, lost weight and died more rapidly than animals that had not been given phloridzin. The quantity of sugar in the urine did not depend upon the quality of the food, but upon the quantity of phloridzin administered. The author estimated the sugar in the blood of dogs which had received a quantity of phloridzin proportional to their weight, and in which the renal arteries or the

ureters had been tied. The first class (in which the renal arteries had been tied) had 0.087 to 0.12 per cent. of sugar; the second (in which the ureter had been tied), 0.18 to 0.21 per cent.

Pathology.—A short note by Sieveking² upon a case of diabetes in which the urine was of low specific gravity gave rise to a series of communications on the same subject. MacIlvaine² found sugar with a specific gravity of 1010 in a man of 60 years; Arthur Robert² found the same specific gravity in the case of a young man of 17 years, passing thirteen pints (6.5 litres) daily. E. G. Gilbert² states that he has frequently found a specific gravity of 1010 and 1015 in elderly patients.

James E. Bloomfield² and Halliburton,² apropos of this discussion, remark that Fehling's test is not sufficient to affirm positively the presence of sugar, since uric acid, glycuronic acid, etc., produce the same reaction.

Charles A. Cameron⁶ recalls the fact that he published, some years ago, ¹⁶ seven cases of low specific gravity; one was that of a patient of the late Dr. Ringland, in which the specific gravity varied from 1008 to 1035. No matter how low the specific gravity was, there was a proportionate amount of sugar present. Sir William Stokes had a patient suffering from glycosuria in which Cameron found, on several occasions, the specific gravity of the urine to be very low, and on one occasion actually 1005. Like other medical analysts, he has observed, now and then, specimens of urine above 1030 which, though exercising a reducing power on Fehling's solution, contained no sugar.

Robert Saundby⁶ also states that he has previously²⁰¹⁰ spoken of the possibility of a low specific gravity in diabetes. The fact is abundantly illustrated by the cases, for out of fifty quoted no less than 5, or 10 per cent., had urine of a low specific gravity. These are: Case 14, E. R., aged 37, specific gravity 1020; Case 16, W. F., aged 57, specific gravity 1020; Case 19, E. H., aged 65, specific gravity 1013; Case 21, W., aged 56, specific gravity 1021; Case 28, A. L., aged 8, specific gravity 1013. The last case shows that this may occur even in young persons, though this little girl was a very chronic case, like her sister, whose urine was only 1025.

Nicholson⁶ observed the case of a woman of 45 years, who had lost flesh since she had been suffering, and proved this by the

misfit of her dress. Her muscles were flabby and wanted tone. The palmar surfaces of the hands were red and glossy and gouty in appearance. Her expression was anxious, worn, and desponding, from the continued itching and burning, which very much diminished her sleep. The tongue was clean, but rather red and irritable; appetite fair; very little thirst; sinking feeling after food, and occasionally acidity; bowels very irregular, and not moved without aperients; polyuria not marked, getting up twice at night; the heart, lungs, etc., normal; the pulse 72, regular, good tension. There was a small papular, eczematous rash on the arms, legs, etc., which itched very much. The urine was pale and limpid, with specific gravity 1022, slightly acid. It yielded a trace of albumen with Esbach's solution of picric acid; and sugar was found on testing with Fehling's solution; on rough quantitative examination she was found to be passing about four grains in the ounce (0.26 gramme in 30 grammes) of urine. On discovering the glycosuria the patient was immediately put on a strict diabetic diet, gluten bread, etc.; strichnine, euonymin pill at night, with mineral water in the morning as aperient, and cocaine ointment to relieve the pruritus. In about three weeks she had completely lost her cares and troubles, pruritus and sleeplessness, and also every trace of sugar, and the specific gravity went down to 1010. Nicholson kept her under strict diet for a month and then gradually allowed starchy food, but absolutely prohibited sugar and limited starch. The patient has remained quite well. The specific gravity of urine ranges between 1010 and 1014.

Clayton,⁶ Oct. 8, '92 in a woman of the same age, with 5 grammes ($1\frac{1}{4}$ drachms) of sugar to the litre (quart), noted a specific gravity of 1020, which fell to 1010 when the sugar had disappeared.

Sir Dyce Duckworth,⁶ Aug. 5 at the British Medical Association, referred especially to chronic cases in middle life. Diabetics were usually active people of vigorous mental powers, and they were muscular, large eaters, and often partook or had partaken freely of alcohol. Lassitude and early fatigue were the earliest symptoms. Vulvar irritation in the female was an early sign. Deep-seated pain in the back was often present. Gout is often present either in the individual or in his relatives. The gouty symptoms often pass away as the glycosuria becomes fully established. The liver is probably involved in most if not in all cases of glycosuria.

Some cases might be described as an attack of gout falling on the liver. He declared that it was his strong conviction that vivisection would be necessary to clear up the problems involved in diabetes. He regarded the liver as being the seat of most of those errors of metabolism which permitted the escape of glucose into the blood. Cases in which albuminuria and glycosuria alternate belong probably to the gouty class. Indulgence in alcohol has been widely regarded as being the chief cause of diabetes, but Sir Dyce Duckworth thought that this cause was chiefly contributory, and that breakdown of the nervous system was always present. If chronic glycosuria were not treated, the course was almost always downward. Cardiac failure might occur, and it might be hastened by a too restricted diet.

Derignac³⁶⁰ believes that, in diabetes mellitus, the total acidity of the urine increases with the proportion of sugar, phosphoric acid, and urea. Moreover, it always increases when symptoms of acetonaemia appear; this is a sign of prognostic importance.

Weintraud²⁷¹ has studied the nutrition in several diabetic patients, in the clinic of Naunyn, suffering from a grave form of the disease. He was able to show that the nutritive process was not increased. If they eat more when upon a mixed diet, they lose the sugar by the urine. In severe cases he was able to cause the disappearance of the sugar by means of a diet containing 100 grammes ($3\frac{1}{4}$ ounces) of albumen and 275 grammes (9 ounces) of fat. In six cases he found that fat was absorbed as easily as in the normal health, and that it had an economic action as compared with albuminoids. Since fat does not increase the production of sugar, the idea of Seegen, to the contrary, must be rejected. The author believes that it is as important to restrict the nitrogenous exchange in grave cases as to restrict the ingestion of sugar, and that this may be accomplished by increasing the amount of fat at the expense of the albuminoids in the diet.

Nervous Complications.—Chauffard³⁶² calls attention to the minor nervous symptoms of diabetes, such as migraine, intercostal pains, dorso-lumbar rachialgia, with pain, girdle constriction, heaviness and feebleness of the limbs, and at the same time some incoordination, sciatic pains, loss of knee-reflex, agenesia, and somnolence. R. T. Williamson, of Manchester,³⁶³ publishes an analysis of 50 cases of diabetes with relation to the knee-jerks. They were

both absent in 50 per cent., both present in 38 per cent., and feeble or one absent in 12 per cent. In patients under 25 years the knee-jerks were absent in 80 per cent.; under 30 years, absent in 75 per cent.; over 30 years, absent in 46 per cent. The severer type of the disease in the young is probably the reason for the higher percentage of absence of knee-jerks in those under 25 years. In relation to general nutrition, the knee-jerks appear to be more frequently absent in noticeably wasted patients and in cases in which the autopsy revealed marked disease of the pancreas. They may be present in cases with lesions of the nervous system; in 8 cases out of 12 there were more or less pains, tenderness, numbness, and cramps in the legs, while in 4 such symptoms of neuritis were entirely absent. Consequently, loss of the knee-jerk is probably due to neuritis. In cases in which the knee-jerks were absent during life examination of the spinal cord yielded negative results.

De Renzi⁵⁹⁶_{Feb.} reports a case of diabetic neuritis in a patient, 38 years of age, suffering from the disease for six years. For three or four years he has had pain along the vertebral column and inferior members, then a growing weakness of the latter and of the left superior member, amounting to a veritable paralysis. Faradic excitability is much diminished, the galvanic being also diminished, and the contraction greatest at the closing of the anode, with diminution of sensibility in all three of the affected members. The quantity of urine was at times 4300 cubic centimetres (8½ pints); specific gravity, 1034; glucose, 120 grammes (4 ounces); urea, 42.5 grammes (1½ ounces); acetone, 0.75 gramme (12 grains); little albumen. The patient had, besides, symptoms of a pulmonary affection, but without the presence of Koch's bacilli. De Renzi thinks that the pneumococcus in a glycohaemic soil may give rise to pulmonary lesions simulating phthisis.

P. Vergely³⁶³_{Aug. 12} concludes that disorders of the peripheral sensory nerves frequently occur in diabetes, disorders of pain and temperature sense predominating. In a certain number of diabetics thermo-dysæsthesia, thermo-hypæsthesia, and thermo-anæsthesia are encountered, the first disorder appearing in patients that have no other sensory disorder. In one instance a diabetic was analgesic and completely thermo-anæsthetic, and presented, to a certain extent, the sensory dissociation observed in myelosyringosis.

Leyden⁴¹_{p. 49} presented before the Balneological Congress prepa-

rations of the spinal cord, showing a lighter coloring of the posterior sheaths than of the rest of the cord, but without warranting the assertion that the lesions were systematic. There was an amylaceous corpuscle between the nervous fibres. Leyden considers this atrophic lesion as secondary, and analogous to that met with in the peripheral nerves in these patients.

Cavazzani⁸⁵⁴ reports the case of a woman of 20 years whose urine for a year had contained from 2 to 3 per cent. of sugar and who died in coma. At the autopsy there were found lesions of the sympathetic system; the ganglia of the neck and thorax were very hyperæmic, and showed small haemorrhages; the connective tissue was more abundant; the nervous cells, especially those of the celiac plexus, were atrophied, with a scarcely-visible nucleus containing abundance of pigment. The pancreas was healthy. The liver showed lesions of the protoplasm similar to that which follows extirpation of the celiac plexus.

Ocular Complications.—Mauthner,⁵⁷ in a complete study of diabetic amblyopia, states that many causes may lead to ocular lesions in this disease. Among them are (1) diminution of water; (2) diminution of resistance of the vessels, due to general weakening of nutrition; (3) the existence of a toxic substance in the blood, produced by abnormal processes; (4) various complications. Mauthner states that diabetic cataract is very rare, the principal lesions, according to him, being the following: Conjunctival haemorrhage, retinal haemorrhage into the vitreous, haemorrhagic glaucoma, detachment of the retina, haemorrhage into the optic-nerve sheath, leading to sudden amaurosis; intra-cranial lesions, causing hemiopia, blindness, disturbances of accommodation, paralysis of the abducens, of the oculo-motor, etc.; trophic lesions, as neuro-paralytic keratitis. Mauthner believes that the sugar in itself is not toxic, and that it is not the quantity of sugar, but the toxic substances, which makes diabetes a grave disease. According to him, the diabetic toxins may produce the following diseases: Ophthalmic zona, phlegmon of the orbit, diseases of the lids, episcleritis, neuro-paralytic keratitis, iritis and irido-cyclitis, exudative retinitis and punctata neuritis, neuro-retinitis, strangulated papilla, and retrobulbar neuritis.

Kamocki²⁵⁴ in examining histologically three eyes and the flaps of the iris taken from diabetic patients who had undergone

operation for cataract, invariably found a proliferation and oedematous tumefaction of the pigmentary layer of the iris. He considers these lesions as pathognomonic of diabetes, no other alteration being constantly met with in subjects of this disease.

Mental Symptoms.—Madigan¹³⁹ Dec. 22 calls attention to the fact that in insanity sugar is sometimes present during the period of quiet, and that it is absent during the period of agitation.

Renal Complications.—Leyden, ⁴¹ June 5 in two cases of persistent albuminuria in diabetes, made an anatomical study of the kidneys, and observed hyaline degeneration of the small arteries, the glomeruli, and even of the primary membrane of the canaliculari,—in fact, a pronounced renal sclerosis.

Salles²⁰¹⁶ divides the albuminuria of diabetes into three kinds,—alternating, concomitant, or substitutive. In the first variety, albuminuria often gives place to another symptom (phosphaturia, azoturia, or to some manifestation of the gouty diathesis); it is not abundant, and is never accompanied by renal lesions. Concomitant albuminuria is more frequent, especially among men and in fatty diabetes; it is not abundant, and often is intermittent; in half the cases its evolution is toward nephritis. Substitutive albuminuria is one of the modes of termination of the concomitant form; it is, besides, very rare, and substitutes the diabetes; the sugar gradually disappears; the urine diminishes in quantity and is deeper in color; the quantity of urea is lowered; the albuminuria is ordinarily quite abundant; death follows by uræmia or some complication.

Bussière⁸⁶⁸ Aug. 12 also publishes a paper upon the renal complications of diabetes, giving a compilation of the literature of the subject.

Hepatic Complications.—As is well known, Hanot, Chauffard, and others have noted the existence of pigmented cirrhosis of the liver in diabetes. Palma⁴ Aug. 21 observed two cases in the clinic of von Jaksch: 1. A man, aged 78, had suffered from increasing weakness for eighteen weeks. The skin was of a brownish color. There was considerable hepatic and splenic enlargement. The urine contained much grape-sugar, but no bile-pigment. The case is described as one of hypertrophic passing into atrophic cirrhosis. 2. A man, aged 43, began with slight jaundice four months previously. Two months later the abdomen began to

swell, and, fourteen days ago, the legs. Ascites was present. The liver and spleen could not be felt. The urine contained grape-sugar, and, occasionally, acetone, as well as bile-pigment. A month later he died. The liver was found to be cirrhotic, the kidneys enlarged, and the pancreas healthy. The liver only contained a small quantity of glycogen. In such cases either the sugar-forming function of the liver is increased and too much sugar gets into the blood, or the liver is not in a position to convert the sugar brought to it into glycogen. The question of alimentary glycosuria must also be considered. Here the limit for the assimilation of carbohydrates is diminished, and a permanent glycosuria may result. The effect of alcohol in this respect has been insisted on. The author draws attention to the pigmentation seen in this case, and refers to the condition of "bronzed diabetes." He concludes by pointing out (1) that the co-existence of these two diseases is very rare; (2) that the liver disease cannot as yet be looked upon as the cause of the diabetes, and that the latter may be a chance complication; and (3) that the name bronzed diabetes should not be used, as pigment may be absent from the internal organs in such cases, and in ordinary cirrhosis without diabetes this accumulation of pigment may also be present.

Diabetic Coma.—The clinical literature of the year upon this important subject is very meagre. We must, however, call attention to the case of Mortimer Rowland (see p. F-78), in which death ensued during a state of coma, occurring while urine was being passed in good quantity (40 ounces—1200 grammes—in twenty-four hours), and even more than on several previous occasions, and also of low specific gravity (1006), free from sugar (probably due to the antidiabetic diet), and not giving the ferric-chloride reaction. The temperature was never above the normal.

Kulz⁸⁴, made the interesting observation that numerous casts appeared in the urine before and during diabetic coma. As a rule, only a minimum amount of albumen was present. No difference was noted in the number of casts, whether the coma terminated fatally or whether temporary recovery took place.

Important *experimental* researches have been made by Vaughan Harley,² who has found, with Prof. Ludwig, of Leipzig, that if the ureters were ligatured certain nervous phenomena were produced when 8 to 10 grammes (2 to $2\frac{1}{2}$ drachms) of sugar per

kilogramme (2 pounds) weight of dog were injected into the jugular vein in the space of about one hour. For the first ten or twelve minutes after the injection the dogs appear perfectly well, though most of them attempt to vomit within that time; they then have trembling of the muscles of the skin, soon followed by general tonic and clonic spasms, with opisthotonus and acceleration of the respiratory movements, which may reach fifty and even eighty per minute. These convulsions return at intervals of five to twenty minutes, and last from eight to ten minutes. Sometimes respiration is arrested and the animal dies; ordinarily, after two or three hours of these convulsions, coma is established. Removing the ligature from the ureter, the coma is dissipated in the course of some hours, otherwise death ensues. This coma is not the result of the excess of sugar in the organism, for the symptoms do not immediately follow the injection of the sugar; it requires two or three hours to cause their full development, and during this time the quantity of sugar in the blood decreases; in two hours it falls from 6.7 per 1000 to 2.9; and six hours after ingestion, at the moment of coma, the proportion of sugar in the blood is only 0.37, while the lactic acid reaches 1.3, and there is, besides alcohol, acetone and diacetic acid in the blood. During coma the gaseous exchange is much diminished. The convulsions are probably the result of an unknown substance, and the coma of asphyxia of the tissues. The rational treatment consists in administering alkalies and diuretics and in the inhalation of oxygen.

Treatment.—Basing himself upon the results obtained in the treatment of myxœdema by the subcutaneous injection of thyroid juice, R. Mansell-Jones², presumes that the injection of pancreatic juice might be followed by good results. Lépine, however, has explicitly shown, by several experiments, that the glycolitic ferment, although formed, at least in part, in the pancreas, is found neither in the pancreatic juice nor in the tissues of the gland itself, which is readily understood when it is admitted that this internal secretion is carried off by the blood (and the lymph) as soon as formed. Hector W. G. Mackenzie^{2,14} injected the pancreatic extract in two cases of diabetes. The dose was $\frac{1}{2}$ ounce (15.5 grammes) three times daily. He does not state the mode of preparation of this extract, nor whether it was simply the secretory product of the gland. After several weeks of treatment there

was no diminution of the sugar, but the general condition was improved.

Neville Wood², administered zymine (?) and pancreatin in keratinized pills, by the mouth, to a diabetic of 13 years of age, for three months, and to a woman of 24 years, for six weeks. There was no diminution of the sugar, although the general state of the patients was improved. Some time later the autopsy of the woman revealed the integrity of the pancreas. Hale White², treated two patients by giving them a diet of raw pancreas, and injecting the extract (?) of pancreas under the skin. The sugar in the urine of the two patients was carefully measured. No therapeutic effect was observed. Arthur L. Marshall², has also tried the injection of pancreatin, without diet, in a case of recent diabetes, without result. Knowsley Sibley², administered raw pancreas to a patient of 26 years, with the result that there was no diminution in the percentage of sugar (12 grains—0.78 grammes—per ounce—31 grammes), but the quantity of urine diminished in the course of the treatment, though under what influence was not determined.

Ralfe¹⁰⁷⁷, after having submitted a girl of 22 years, whose urine had a specific gravity of 1035 and contained 150 grains (9.75 grammes) of sugar daily, to morphine for several days, in doses of $\frac{1}{3}$ grain (0.02 grammes), obtained no result. He then caused her to ingest 1 ounce (31 grammes) of raw sheep's pancreas each morning. The specific gravity of the urine remained the same, but the quantity and the amount of sugar diminished. On suspension of the treatment for two days the sugar was augmented; on resumption it fell to about half (60 to 70 grains—3.90 to 4.55 grammes). At the same time the weight of the patient increased.

W. A. Wilks², publishes a case of the same kind, observed at the Westminster Hospital, in the service of Donkin. The patient was a man of 45 years, suffering from a light form of the disease, who was placed upon a diet, but who did not completely follow it. The maximum quantity of sugar excreted in twenty-four hours was 240 grains (15.55 grammes), the smallest 56 grains (3.63 grammes). Opium did not reduce the sugar. It would seem, by a careful examination of the table accompanying the article, that the ingestion of raw pancreas caused a slight diminution of sugar; but this fact is not beyond discussion.

Rémond and Rispail⁹²⁷ _{Apr. 18} treated a case in a patient of 21 years by the injection of pancreatic juice crushed in a mortar, with water and glycerin added. A small number of injections were made, and seemed to cause a diminution in the quantity of urine and in its specific gravity. In the discussion upon this paper, Brown-Séquard and d'Arsonval advised the combination of pancreatic juice with testicular juice, as they considered it more efficacious. Battistini¹¹⁰² _{May 15} communicated his researches on the subject to the Academy of Medicine of Turin. He administered the pancreatic extract treated with glycerin to two patients, in doses of from 5 to 20 cubic centimetres ($1\frac{1}{4}$ to 5 fluidrachms). Carbohydrates formed a large part of their diet. There was a great diminution of sugar and an amelioration of the general condition, but a tendency to an augmentation of the quantity of urine.

Hensher⁴¹¹ _{No. 21} treated a grave case with piperazin. The quantity of sugar fell from 7 and 8 per cent. to 3.3 per cent. The remedy was administered for a fortnight in daily doses of 1 to 1.5 grammes ($15\frac{1}{2}$ to $23\frac{1}{4}$ grains) in three portions. The subjective condition of the patient improved. Hildebrandt¹¹⁶ _{p. 963} also recommends piperazin in doses of 1 or 1.5 grammes ($15\frac{1}{2}$ to $23\frac{1}{4}$ grains) three times daily. He has observed that this drug causes the cessation of glycosuria in the dog after the ingestion of phloridzin.

William F. Waugh⁷⁶⁰ _{Oct. 8, 192} had a patient, a man of 60 years, of gouty diathesis, whose urine contained $3\frac{1}{2}$ per cent. of sugar. This disappeared under the influence of lactate of strontium and a suitable diet.

Weil,³ _{Jan. 3} in replying to the articles published on all sides as to the negative results of treatment by myrtilla pills, maintains that diet alone would have been incapable of bringing about the good results observed by him. Joseph Gruber¹⁶⁹ _{Sept.} has treated a case in the service of Drasche, of Vienna, first with this drug, and later with piperazin. The patient was 17 years old. He was given a meat diet, with the addition of 70 grammes ($2\frac{1}{4}$ ounces) of semmel (dry rolls) and of 500 grammes (1 pint) of milk, with three pills of extract of myrtilla. Three days after beginning the treatment the urine, which before had contained 7.7 per cent. of sugar, contained only 5 per cent. The quantity was five litres. The pills

were increased to 20 per day. The effect was entirely negative. Piperazin in doses of $1\frac{1}{2}$ grammes (23 grains), in three parts, produced a subjective improvement. There was a slight diminution of sugar, but, at the same time, a loss of weight. The author concludes that the extract of myrtilla is absolutely without effect, but that piperazin is worthy of trial.

Nicolaier,²⁰² in common with other writers, warmly recommends salol, in doses of 2 grammes (31 grains), three times a day, and prefers it to salicylate of sodium. It is especially indicated in cases where the patients cannot be submitted to rigid diet. If symptoms of intolerance appear, it is, of course, necessary to suspend its use, especially if there be buzzing of the ears and loss of appetite. Albuminuria is a contra-indication. In several cases salol failed without any cause which could be discovered by the author. In one of these cases a proper diet caused the complete disappearance of the sugar.

John Dougall²¹³ reports the case of a man of 21 years, a blacksmith, who passed at least 226 ounces (7028 grammes) of urine, containing 15 ounces (466.5 grammes) of sugar. He was placed on a diet, and half a fluidrachm (2 grammes) of fluid extract of ergot was given three times a day. Three weeks after admission to hospital the thirst was entirely gone, the quantity of urine had fallen to about 65 ounces (2 litres) daily, the sugar to $4\frac{1}{2}$ grains (0.3 gramme) per fluidounce (31 grammes) of urine, and the patient said he felt quite well. Two months later the ergot was stopped, and after two days it was found that the sugar had increased to 52.7 grains (3.42 grammes) per ounce of urine, or 9.6 ounces (295 grammes) daily. He was put upon $1\frac{1}{2}$ fluidrachms (5.83 grammes) of ergot three times daily, which was continued until he left the hospital, when his condition was as follows: No thirst; urine, 64 ounces (2000 grammes) daily; sugar, 4.9 ounces (152 grammes); the knee-jerk remained absent.

W. E. Lawrence⁹, saw the sugar disappear in a woman of about 60 years of age, who was submitted to a diet and the administration of jambul. Vix¹¹⁶ has had success with preparations of jambul-bark. Most preparations are made from the fruit, which contains more of the active principle, but the fluid extract of the bark is pleasanter to the taste, while the cost is less. Vix gives the details of two cases in which as much as $2\frac{1}{4}$ ounces (70

grammes) were given daily with excellent effect. The mode adopted was to give 2 to 5 drachms (7.75 to 19.50 grammes) several times a day, in half a pint to a pint ($\frac{1}{4}$ to $\frac{1}{2}$ litre) of water or wine, with a small quantity of saccharin. Leoni⁵⁰⁵_{Jan.} reported the results obtained, in four cases of diabetes mellitus, with extract of the seeds and bark of jambul. The doses given varied from 10 to 100 grammes ($2\frac{1}{2}$ drachms to $3\frac{1}{2}$ ounces) in the twenty-four hours. In three of the cases there was marked diminution in the quantity of urine and the sugar. In the fourth case the amount of urine, sugar, and urea was increased, but notwithstanding this the body-weight increased and the patient improved in health. Murray⁶_{Feb. 25} refers to the value of the treatment by arsenic. He first puts the patient on restricted diet and codeia, and when by these means he has reduced the quantity of sugar he prescribes arsenic, keeping up the treatment for three months.

N. S. Davis⁶¹_{Aug.} believes that patients are often placed too quickly on a rigorous diet. A sudden change of regimen may cause a disinclination for food, great mental depression and physical malaise, terminating in fatal diabetic coma. As to drugs, he disapproves of antipyrin and recommends the solution of arsenic and bromide. Schmitz⁶⁹_{No. 27} insists that a diet consisting of a great deal of meat augments greatly the quantity of sugar in diabetes, in grave cases. This fact, to which Naunyn and others have already called attention, accords perfectly with the results obtained by Lépine (see p. F-81) as to the production of glucose *in vitro* at the expense of peptones. He consequently limits the amount of meat in grave cases, and allows a varied diet and especially fat. In this way the amount of sugar is greatly lessened and the general health improved.

Leyden⁴⁴_{p. 498} reports several experiments made by him with levulose, from which it appears that the addition of 25 or 30 grammes ($6\frac{1}{2}$ to $7\frac{1}{2}$ drachms) of levulose to the diet augments but slightly the amount of sugar, thus showing that this sugar is better adapted than any other for use in diabetes.

De Renzi⁵⁰⁶_{June} administered 20 to 100 grammes ($5\frac{1}{6}$ drachms to $3\frac{1}{8}$ ounces) of levulose to three diabetic patients at a time when there was no sugar in the urine. In the first, 60 grammes ($1\frac{1}{2}$ ounces) produced no sugar, but 75 grammes ($2\frac{1}{2}$ ounces) caused the appearance of from 10 to 14 grammes ($2\frac{1}{2}$ to $3\frac{1}{2}$ drachms) in the

twenty-four hours. Examined with the polarimeter, the urine deviated to the right (proving that it contained glucose). In the second case, 100 grammes ($3\frac{1}{8}$ ounces) of levulose showed no sugar. In the third case, 50 grammes ($1\frac{1}{2}$ ounces) of glucose caused the appearance of 10 grammes ($2\frac{1}{2}$ drachms) of sugar in the urine.

Robert Saundby³² has abandoned the use of gluten-bread because the best of it contains 30 per cent. of starch, and because it is unpalatable and very expensive. He also criticises the bread of aleurone of Ebstein. Clark's starchless biscuits are palatable, but too hard for patients having bad teeth. He submits the following recipes, which he approves of and uses for his patients: 1. Almond cakes: 1 pound of ground almonds; cost, 1 shilling, 5 pence; 4 eggs, 4 pence; 1 tablespoonful of milk; a pinch of salt. Cost, 1 shilling and 9 pence. Beat up the eggs and stir in the almond-flour; divide in twelve flat tins; bake in a moderate oven for about forty-five minutes. The weight when cooked is $1\frac{1}{2}$ pounds. 2. Cocoa-nut cakes: $\frac{3}{4}$ pound (375 grammes) finest desiccated cocoa-nut, $3\frac{1}{2}$ pence; $\frac{1}{4}$ pound (125 grammes) ground almonds, $4\frac{1}{2}$ pence; 6 eggs, $6\frac{1}{4}$ pence; $\frac{1}{2}$ teacupful of milk. Cost, 1 shilling and 2 pence. Beat up the eggs and stir in the cacao-nut and almond-flour; divide into sixteen flat tins, and bake for twenty-five minutes in a moderate oven. The weight when baked is $1\frac{1}{2}$ pounds (720 grammes). Two additional eggs may replace the milk with advantage, but will increase the cost. The author also recommends Iceland moss. It should be well soaked in water for about three hours, then boiled in milk for three-quarters of an hour, strained, sweetened with saccharin or glycerin, poured into a mold, and allowed to cool.

Hale White¹⁵ discusses the recent researches upon the value of the soya-bean, and states that, according to the analyses of Saundby and Attfield, soya-bread contains about the same quantity of carbohydrates as gluten-bread; nevertheless, its use is not disagreeable to certain patients, and he reports three cases in which the weight of the body increased while it was used. Hirschfeld⁴⁷⁵ insists upon the importance of fat in the alimentation of diabetics. He attaches little importance to medicinal treatment, opium and its derivatives being the only drug to be retained. Muscular exercise to a moderate extent is useful.

Lécorché²⁰¹³ has devoted a little volume to the treatment of diabetes. He rejects the diet of Donkiss, saccharin; forbids cherries, but permits pears, peaches, and prunes (!). He disapproves of almost all the artificial breads (permitting the potato, the sweet potato); forbids beer, sweet wines, and champagne. As to medicines, he considers the alkalines, opium, and arsenic (!) as complete antidiabetic remedies, which in his hands have given good results (!) in all forms of diabetes.

William Henry Porter<sup>462
Nov., '92</sup> thinks that the condition of the liver may be improved and the biliary secretion excited by administering every five hours, until a cholagogue action has been obtained, one of the following tablets: arsenious acid, 1 grain (0.065 gramme); bichloride of mercury, 1 grain (0.065 gramme); powdered ipecac, 2 grains (0.13 gramme); mild chloride of mercury, 16 grains (1.04 grammes). Mix and divide into fifteen tablets. To remedy constipation in the anaemic state, he employs capsules containing the bile of beef, extract of pancreatin, haemogallol, hydrochlorate of caffeine, extract of colocynth, etc. Shufelt<sup>462
Nov., '92</sup> does not approve of the mixture of haemogallol and colocynth, which contains tannin. He recommends lithine.

FEVERS.

BY JAMES C. WILSON, M.D.,

AND

AUGUSTUS A. ESHNER, M.D.,

PHILADELPHIA.

GENERAL CONSIDERATIONS UPON FEVER.

IN the absence of anatomical demonstration Herz⁵⁷ Nov. 30, 1892 does not admit the existence of thermo-regulatory centres. The theory of heat retention and increased heat production also is not satisfactory. As under febrile conditions the entire organism suffers, every cell likewise suffers; so that fever is to be viewed as a property of the protoplasm itself. It is difficult to understand that such a process should occur only in the most highly organized and not in the lowest forms of protoplasm as well. The opinion is expressed that febrile elevation of temperature is a product of the protoplasm, and it has been demonstrated that every cell in the animal kingdom is capable of warming itself. Experiments were made with yeast-cells and numerous analogies found to exist between these and the cells of mammalian organisms. An apparatus was constructed by means of which the metabolism of first the healthy and then the diseased yeast-cell was studied. It was found that the infected yeast-cell generated a larger amount of heat than the healthy cell. The investigations showed, further, that there is no organism that regulates its own warmth. The addition of menthol to the fermenting fluid caused the temperature to decline to the normal. It is believed to be thus demonstrated that manifestations can be induced by infection of lower organisms similar to those observed in febrile animals, though the position is not taken that the yeast-cell is capable of displaying fever.

Obelar⁵⁸ June 24 has reported the case of a woman, 32 years old, with a tuberculous family history, who had been losing flesh for several months and presented moderate fever, frequent cough, excessive diarrhoea, and night-sweats. A sudden aggravation of

the condition taking place, the temperature was found to be a little above 45° C. (113° F.). On the next day another, standardized, thermometer recorded a temperature of 46° C. (114.8° F.). On the evening of the same day the thermometer first used, placed in the axilla, recorded a similar temperature; the instrument broke in consequence of the undue expansion of the mercury. A temperature of 46° C. (114.8° F.) persisted for some time, except upon one evening, when the thermometer recorded 42.3° C. (108.1° F.). The measurements were made at various times of the day, and with the greatest care. Four different thermometers yielded the same results. The sensorium of the patient was undisturbed. The opinion is expressed that a condition of pyæmia existed, perhaps as the result of a communication between a pulmonary cavity and the general circulation.

Keating, of Colorado Springs,⁴⁵¹ calls attention to a tendency to hyperpyrexia manifested by cases of febrile conditions observed at high altitudes. Children suffering from slight forms of indigestion display temperatures and nervous symptoms that at sea-level would occasion concern, the general appearance and the general condition, however, not being affected correspondingly. On the other hand, subnormal temperatures are also said to be not infrequent, as, for instance, after labor. The explanation is suggested that this peculiarity of the temperature may be dependent upon nervous influences, related to the atmospheric conditions at high levels. Freund⁶ administered to a patient with intermittent fever phosphoric acid during the intermissions, with the result that the phosphates in the urine were increased. As soon, however, as the cold stage of the fever came on the phosphates disappeared from the urine, and only regained their ordinary quantity after the lapse of some hours. It is concluded, therefore, that the absence of phosphates is due to their retention in the system rather than to suppression of the metabolic changes to which their excretion is due.

GENERAL CONSIDERATIONS UPON TREATMENT OF FEVER.

In a review of the question whether or not it is desirable to relieve pyrexia by the administration of antipyretics Armstrong⁹ takes the ground that fever is the expression of some disturbance of the thermal centres. While this disturbance may be traumatic, it is usually the result of the presence in the organism of certain

autogenous or heterogenetic (infectious) products that have the same affinity for the thermal centres as certain vegetable alkaloids have for certain cerebral centres. Fever does not exercise any beneficial effect in limiting an infectious process; this is demonstrated clinically by the occurrence of cases of infectious disease that pursue their usual course without any rise of temperature. It is the general experience of clinicians that the relief of fever exercises a beneficial influence on the general condition of the patient, though the apyrexia does not indicate that the cause of the pyrexia has been removed. In many febrile conditions the causative principle has produced a thermotaxic paresis that is at once relieved by some suitable antipyretic. In continuing the employment of antipyretics sight should not be lost of the possibility of obtaining, either synthetically or derivatively, compounds that will, when administered in the specific diseases, have the same inhibiting influence on the further development of the micro-organisms of those diseases that certain alexins, toxalbumens, or toxins have. The action of such compounds should be as specific in each infectious disease as is the action of quinine in paludal fevers.

Ssokolow ⁵⁸⁶ _{Nov. 14, 16, 21; Sept. 2} ²¹ records the results of observations made upon fifty healthy and thirteen febrile children to determine the effects produced by the administration of quinine, antipyrin, sodium salicylate, each in doses of 0.5 grammie ($7\frac{1}{2}$ grains); phenacetin, in doses of 0.25 grammie (4 grains); antifebrin, in doses of 0.3 grammie ($4\frac{1}{2}$ grains). It was found that in healthy children antipyrin most increased the cutaneous transpiration; next in activity was phenacetin; while sodium salicylate and quinine exerted scarcely any influence whatever, and antifebrin caused a diminution. In febrile children antifebrin increased the perspiration most; antipyrin not to the same degree; while sodium salicylate, quinine, and phenacetin caused suppression of the secretion. In enteric fever the cutaneous transpiration was found to be greater than normal. Barr, of Calamine, Tex., ¹⁰⁹ concludes that acetanilid reduces febrile temperature by virtue of its power to surrender up the water that holds it in solution and to again assume the crystalline form.

Sciolla ³ _{Apr. 14, May 27} has observed that the application to the skin of the abdomen, back, chest, or extremities of from 30 minimis

(3.20 grammes) to $2\frac{1}{2}$ drachms (10 grammes) of tincture of guaiacol in febrile cases is followed by a reduction of temperature. The action is accelerated when the part to which the application is made is enveloped in gauze covered with gutta-percha tissue. Deservescence is usually accompanied by perspiration, but without cyanosis or other alarming symptoms. Thus administered, guaiacol is eliminated by the kidneys in the form of guaiaco-sulphuric ether, which appears in the urine about an hour after the skin has been painted. The application may be repeated several times in the course of twenty-four hours.

Humphrey, of Fairbury, Neb.,¹⁸⁶ reports that, in the treatment of fevers at an altitude of from 1000 to 1300 feet or more above sea-level, he treats the febrile condition by means of relaxing and diaphoretic remedies. A favorite prescription contains fluid extract of gelsemium, 1 fluidrachm (4 grammes), and water sufficient to make 4 fluidounces (125 grammes), of which a teaspoonful is given every hour. In some cases aconite is used; in others veratrum viride or belladonna. The room is kept at a temperature calculated to facilitate diaphoresis.

INFLUENZA.

Bacteriology.—Pfeiffer, of Berlin,¹⁸⁷ points out that the sputum of influenza patients presents certain macroscopic peculiarities, being greenish yellow, tough and viscid, usually copious, and appearing in nummular masses. On bacterioscopic examination organisms were found that had rounded extremities, were not quite as thick as the bacilli of the septicæmia of mice, and were ordinarily two or three times as long as wide. A capsule could not be demonstrated; neither did the organisms appear to possess motility. Cultures were obtained upon agar by direct inoculation with the sputum, but the colonies could not be further transmitted. Investigation showed that their growth depended upon the presence of blood and of the haemoglobin in particular, so that cultivations could be continued indefinitely upon agar to which either blood or haemoglobin had been added. The colonies formed are small, and do not cause liquefaction. They are characterized by a peculiar vitreous transparency. The organisms are rigidly aerobic. They grow at temperatures between 26° and 27° C. (78.8° and 80.6° F.), though best at 37° C. (98.6° F.). They do not live long in sterilized water, and are

extremely susceptible to drying, though it is probable that in moist sputum they retain their infectiousness for at least two weeks. The existence of spores could not be demonstrated, and there is considerable additional evidence to warrant a belief in their non-existence. It is thought that the contagion is usually transmitted by the moist secretions from the nasal and bronchial mucous membrane. The observations made were confined to cases of the catarrhal type of influenza. While the nasal secretion in these cases contained the characteristic bacilli in large numbers, that of cases of ordinary coryza contained remarkably few bacilli of any kind, and none at all of those believed to be peculiar to influenza. Early in the attack the organisms were found free in large numbers, but later on they were found in progressively increasing number within pus-cells. It was not possible to find the organisms in the blood. In fatal cases a peculiar form of pneumonia was found after death, somewhat lobular in distribution, and with an entire absence of fibrin from the extravasation, the centre of each consolidated lobule presenting a small, grayish-yellow nodule. The organisms were found in progressively increasing number in passing from the superficial to the deeper structures of the lung. The most favorable result of the pulmonary process that can occur is resolution, the purulent masses in the lung being expectorated. On the other hand, abscess-formation may take place, or the infiltrated tissue may at once become transformed into fibrous tissue, induration or carnification resulting. Finally, the case may terminate in pulmonary gangrene; and it is believed possible for caseation to take place. In examinations in a large number of cases of bronchitis and broncho-pneumonia, at a time when influenza was not prevalent, an organism was found that so closely resembled the bacillus of influenza in form, in reaction to stains, and in culture, that the name of pseudo-influenza bacillus has been given it. The pseudo-influenza bacillus is, however, larger in all dimensions than the organism of influenza proper, and forms in long chains. It is believed that some relation may exist between the two organisms, and that they may be members of one group.

The annexed colored plate will serve to further illustrate the results attained. Fig. 1 represents sputum from a case of influenza during the febrile stage, with the bacilli free; Fig. 2, the sputum from a case of influenza during the period of defervescence,

with the bacilli inclosed in pus-corpuseles; Fig. 3, the sputum from a case of influenza during convalescence, the bacilli showing degenerative changes; Fig. 4, the influenza bacilli in pure culture; Fig. 5, the bacillus of pseudo-influenza; Fig. 6, portions of the same bronchi, more highly magnified; Figs. 7 and 8, transverse sections of bronchi at various stages of influenzal catarrh, under a low power; Fig. 9, a section through infiltrated pulmonary tissue in the centre of a typical influenzal process.

In a post-mortem examination of five cases of influenza, clinically characterized by symptoms simulating those of cerebro-spinal meningitis, Pfuhl, of Berlin,^{4 Sept. 26, Oct. 3, '92} found congestion of brain, cord, and membranes, meningeal exudation, flattening of the convolutions, œdema, distension of the ventricles, dilatation of the capillaries, with haemorrhagic extravasations, and in one of the cases a collection of pus in the cerebellum. In all of the cases bacteriological examination disclosed, in the blood-vessels and lymphatics, the presence of the bacilli described by Pfeiffer as characteristic of influenza. In some situations the bacilli had formed thrombi; they were also found in the liver, spleen, and kidneys. They were commonly associated with the bacilli of decomposition and two different forms of diplococci.

Markl⁷⁵⁸_{No. 29, 34, '92}⁸¹⁴_{Jan. 1} details the result of a careful study of 11 cases of typical, uncomplicated influenza. On examination of the blood, obtained with the most rigid precautions, he found a small number of ovoid bacilli, from 0.8 to 1.5 millimetres long, and from 0.3 to 0.6 millimetre thick, rounded at one extremity and pointed at the other. The organisms did not take stains well, the poles being usually stained, while the middle did not stain. They developed upon agar and upon gelatin. The injection of cultures into the veins of rabbits was followed by fever and death. In the blood of these animals the same ovoid bacilli were to be found. Other rabbits inoculated with the blood from the first series of rabbits failed to present symptoms of influenza. Similar bacilli were found in the sputum of cases of influenza. Rabbits inoculated with this sputum presented symptoms of influenza, and finally died. Rabbits inoculated with the blood from these animals likewise presented symptoms of influenza, and also died. Lemière, of Lille,²²⁰_{Sept. 20, '92} found that in the majority of cases, if not in all, in which suppuration occurred, in the course or

Für

Fig. 2.

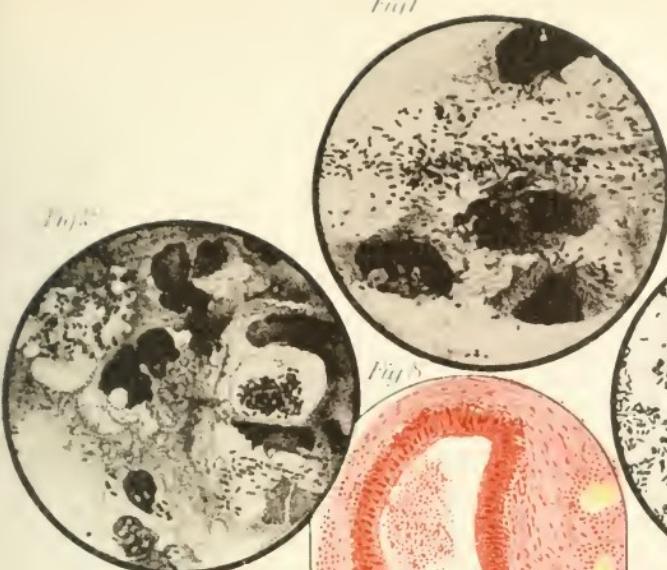


Fig. 4.



Fig. 5.

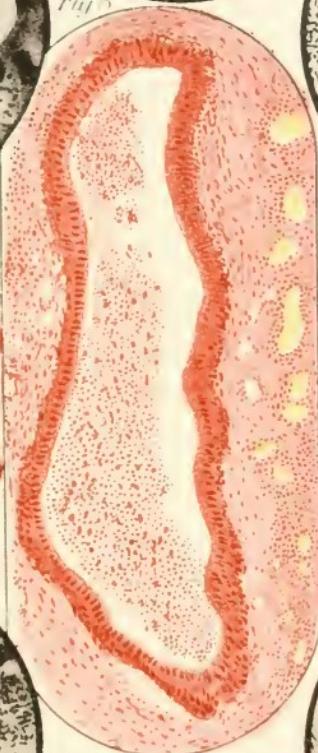


Fig. 7.

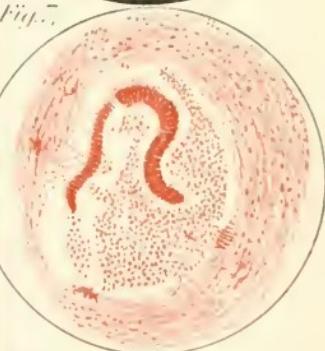


Fig. 6.



Fig. 3.



Fig. 9.

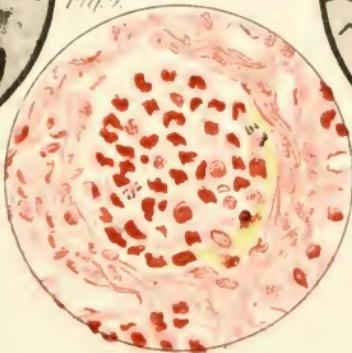


Fig. 5.



influenza (Pfeiffer)

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sequence of influenza, the pus at some time contained pneumonia cocci. The microbe of influenza, described by Pfeiffer, is not always found in the pus that forms in the course of the disease.

From a survey of the literature of the influenza epidemic of 1889-90, Seitz, of Zurich,²¹⁴ arrives at the conclusion that the disease is of bacillary origin, and transmissible by human intercourse, particularly through influenza patients. One attack confers relative immunity to subsequent infection; so that of two successive epidemics the second is likely to spread the less rapidly and to be the less extensive. From the nature of the causative factors, new outbreaks are likely to take place after an epidemic has once occurred. The epidemic progress of the disease is not influenced by season, except in so far as this may affect human intercourse.

Symptomatology.—Delezenne, of Lille,⁹² describes as a distinct clinical variety a group of cases of influenza to which he applies the qualification "typhoid." The onset of the attack is usually abrupt. Prodromes are obscure or wanting. Among the earliest symptoms are repeated and irregular chilliness, malaise, depression, muscular pains in the muscles of the extremities and of the lumbar region, and frontal and supra-orbital headache. These symptoms appear almost simultaneously, and reach their maximum intensity in the course of a few hours. They are frequently accompanied or followed by epistaxis, vertigo, tinnitus aurium, nausea, and vomiting. The appetite is lost; thirst is increased; a bitter taste is complained of; the tongue is red at the edges and tip, but generally moist and covered in its middle with a heavy, grayish-yellow coat. At first there are no abdominal symptoms; constipation is the rule. Sore throat, coryza, or laryngitis may be present. At the end of several days the depression becomes extreme and the facies expressive of stupor and hebetude. Insomnia, delirium, and deafness now appear, with other symptoms characteristic of the typhoid state. In grave cases the lips become dry, sordes collect upon the teeth, the tongue is tremulous, and speech is embarrassed and drawling. Sometimes there develops a sort of semi-coma, with hallucinations, carphology, and subsultus tendinum. This period ordinarily lasts about a week. Meanwhile the constipation may persist, or be replaced on the second or third day by diarrhoea; though this may be entirely

wanting, or appear only at the end of the acute stage, or even during convalescence. The stools are numerous, and almost colorless and odorless. The abdomen is often distended and painful on pressure. The muscles are tender and the skin hyperesthetic. Gurgling is ordinarily present, but, like the pain, it may be diffused over the entire abdomen, though most marked in the right iliac fossa. Rose-spots and sudamina may also be present. The spleen is usually enlarged and sensitive to pressure; the liver may be transiently enlarged; the urine is almost always albuminous. Most of the symptoms of the first stage persist during that just described. The headache may preserve its previous intensity; the muscular pains may extend to the extremities, the loins, the nape of the neck, the abdominal muscles, the thorax, and elsewhere. The anorexia, the nausea, and the coated tongue ordinarily do not disappear until convalescence has set in. The manifestations detailed are often accompanied by broncho-pulmonary symptoms. Often there is cough, with copious expectoration and dyspnoea. On auscultation sonorous and sibilant râles are to be heard throughout both lungs, with subcrepitant râles at the bases. Sometimes a notable diminution of the vesicular murmur is apparent. The pulse is ordinarily small, rapid, soft, and compressible. The thermometric curve presents no peculiarity beyond that which belongs to influenza in general. The duration of the individual attack may be from one week to three weeks, the symptoms subsiding gradually. Convalescence is always protracted, being characterized by the persistence of the muscular pains, by lassitude, and depression. Cough, anorexia, and diarrhœa may also persist. This form of influenza must be differentiated from enteric fever. The prodromal period of enteric fever is the longer,—the malaise, the anorexia, the pains in the back ordinarily lasting for a week. In influenza prodromes may be entirely wanting, while epistaxis is insignificant or absent. On the other hand, the repeated chills, the coryza, and the laryngitis are absent in enteric fever. The headache of influenza is sharp and lancinating, and often frontal or temporal. In enteric fever it is rarely as intense, the pain being referred rather to the nape of the neck. The muscular pains are likewise the more marked in influenza, and also the more persistent. The hyperesthesia of influenza is not encountered in enteric fever. In influenza the tongue is not dry, fissured, and

blackish as it is in enteric fever, but remains moist and covered with a membrane-like coating. The delirium, the hallucinations, the subsultus, the carphology, and the coma are usually less pronounced in influenza than in enteric fever. Gurgling is the more generalized and constipation the more common in influenza; the stools are less ochre-colored and less fetid. The spleen is rarely enlarged to the same degree in influenza as in enteric fever, and the pulse is rarely dicrotic; the cough is ordinarily more intense, the expectoration more abundant, and the dyspnoea more pronounced; the physical signs are more marked. Enfeeblement of the respiratory murmur, so commonly observed in influenza, is rarely encountered in enteric fever; the temperature at the outset in the latter rises gradually and progressively, while in influenza it does so suddenly, on the first or second day, or, if gradual, without the regularity observed in enteric fever. At the height of the attack of influenza the thermometric oscillations are greater and less regular than in enteric fever; the temperature rises after it has fallen, which it does not do in enteric fever.

At a meeting of the Société médicale des Hôpitaux, Faisans^{14 May 25} called attention to a peculiarity of the tongue that he had observed in cases of influenza, and which he believed to be characteristic. It consisted in an appearance of porcelain-like whiteness, associated with humidity. The coloration was sometimes uniform, sometimes mottled. It made its appearance within the first two or three days of the attack, and sometimes persisted until the patient believed himself well. Shelly^{2 Apr. 15} has observed, in a considerable number of cases of influenza, a peculiar vesicular eruption on the soft palate, which he considers characteristic. The eruption consists of little vesicles resembling sago-grains, of from 0.5 to 1.0 millimetre in diameter. These were situated chiefly upon the soft palate, though they sometimes appeared upon other parts of the pharyngo-buccal cavity. The condition was more marked in the respiratory forms of influenza and somewhat antedated the onset of other symptoms, and remained after these had subsided. Jones^{2 May 27} reports a local epidemic of influenza, attended with high mortality from hyperpyrexia, in a remote, comparatively inaccessible, sparsely populated, mountainous country district, of an area of about three or four miles, and not traversed by any highway of communication between large centres of population. The com-

munity was largely engaged in agricultural pursuits. The patients ranged in age from 8 to 53 years. There were twelve fatal cases, all in males. Symptoms of a catarrhal condition of the respiratory tract were practically absent. Treatment was of no avail.

Complications and Sequelæ.—Putnam, of Boston,⁹⁹ Oct. 13, 192 reviews the neural complications of influenza and reports three cases. One of these was in a single woman of 72, who, previously in good health and without indications of renal or cardiac disease, was, several weeks after convalescence from an attack of influenza, suddenly seized with loss of consciousness, lasting for fifteen minutes. Several days later there was twitching of the left side of the face and of the left arm, without derangement of consciousness. Finally left hemiplegia developed and consciousness was lost, to be regained partially a little time before death. At the post-mortem examination, in addition to some atheroma of the basal vessels, the cerebral perivascular lymph-spaces were found to be dilated, with areas of staining and slight softening in the right basal ganglia and internal capsule. On microscopic examination of the softened tissue there were found haemorrhages from capillaries and small arteries, with fullness of all of the vessels; a considerable number of colorless blood-cells in the vascular sheaths, and often in the surrounding tissues; a modification of the normal structure of the tissues in the areas occupied by the haemorrhages; and hyaline bodies suggestive of corpora amylacea. The second case was in a man 38 years old, who, eight weeks after an attack of influenza, attended with intense headache, while sneezing violently, found that he could not see or hear. Two weeks later an attack of left hemiplegia occurred, and speech became slightly impaired. The symptoms gradually subsided, but after the lapse of more than a month ophthalmoscopic examination disclosed the existence of well-marked bilateral optic neuritis, with moderate swelling and slight haemorrhages. In the third case, a man 55 years old was thought to have influenza. The left arm and leg became paretic, and left-sided convulsions occurred repeatedly, with loss of consciousness. The urine contained no albumen; the temperature was but slightly elevated. The hemiplegia upon the left side became complete. In view of the possibility of the occurrence of meningeal haemorrhage, or of the existence of an abscess, the skull was trephined. When the dura was opened the

brain did not pulsate. The cortex was dark in color and a thick layer of pus followed the course of the large vessels visible in the opening. The patient became conscious after the operation, but later the convulsions returned and led rapidly to death. It is thought that a purulent meningitis existed. Putnam⁹⁹ also reports the case of a man in middle life and previously in good health, who, following an attack of severe and typical influenza, presented inco-ordination of all four extremities, with impairment of sensibility and other symptoms pointing to chronic neuritis, probably associated also with myelitis. After the subsidence of the early symptoms of the illness, severe epigastric pain, of the nature of the "girdle sensation," set in and persisted for a year. The weakness that developed in the legs became transformed into inco-ordination, and this became so pronounced as to prevent walking alone. There was little paraesthesia, but a high degree of impairment of sensibility in the feet and legs, gradually diminishing toward the upper part of the thighs. The knee-jerk was absent. The hands were also ataxic, and there was slight lack of control over the bladder. Other symptoms of posterior spinal sclerosis were not present. Leyden, of Berlin,¹⁰¹ has reported a case of multiple neuritis and one presenting the clinical features of acute ascending paralysis of the type described by Landry in the sequence of influenza. Paret, of Lyons,²¹¹ has reported the case of a woman 20 years old, without hereditary predisposition, in which an attack of influenza was followed by suppression of menstruation, previously regular. At the same time the woman became morose and taciturn, eating irregularly, and sometimes going for weeks without food. The clinical picture was that of melancholia with stupor. There was marked emaciation, but no evidence of visceral disease. The pulse was ordinarily above 100; often it was 160 per minute. The temperature was almost always subnormal. There was no disturbance of sensibility. The muscles displayed a tendency to stiffness, which in the course of time progressed to actual contraction. The condition gradually grew worse until death ensued. At the post-mortem examination evidences of meningo-encephalitis of infectious origin were found.

Kapper⁸⁴ has reported the case of a man who complained of pain at the lower boundary of the chest, at the insertion of the diaphragm, as well as on both sides of the neck, radiating toward

the shoulders and the back. There was shortness of breath and painful, superficial, and moderate hiccough. The latter became aggravated and occasionally accompanied by yawning or vomiting. The temperature was elevated, but on the morning of the second day it had fallen. By the fifth day the spasm of the diaphragm had diminished both in frequency and in intensity, and in the course of two weeks all of the symptoms had disappeared. Examination of the sputum disclosed the presence of the bacillus described by Pfeiffer. Various therapeutic measures were employed, but the best results appeared to be obtained from faradization of the phrenic nerves, the diaphragm, and the epigastrium, after the administration of antipyrin.

Gowers, of London,⁶ points out that, as in other acute specific diseases, there is no relation between the nervous sequelæ of influenza and the severity of the primary disease. He believes that one attack affords no protection against subsequent infection, and that many of the most serious sequelæ follow second or third attacks. No division of the nervous system escapes,—spinal or cerebral, motor or sensory. The sequelæ present themselves as organic affections, as well as in the garb of the various neuroses and psychoses. In the vast majority of cases the prognosis is good. Wilks, of London,⁶ contends that what are commonly described as the nervous sequelæ of influenza constitute a very essential part of the complaint proper, and in many cases are the primary and only symptoms. Many of these are observed during the first few hours of the illness and continue until its termination. During the last epidemic a striking feature in the fatal cases complicated by pulmonary affections, bronchial, congestive, or pneumonic, was the remarkable depression, apparently due to a direct influence upon the heart. In some of the cases of this kind the failure of the heart's action was so abrupt as to distinguish them from cases of ordinary pneumonia or bronchitis. Pope²⁶ reports cases of the following forms of nervous disease that he has observed in the sequence of influenza: acute cerebritis, peripheral neuritis, chorea, urticaria, anosmia, optic neuritis, irregularity and irritability of heart, angina pectoris with albuminuria, sciatica, and lumbago.

Hetherington and Brown, of Ipswich,⁶ have reported the case of a boy of 15, in whom, during an attack of influenza, there appeared increased thirst, increased frequency of micturition in in-

creased amounts, and loss of flesh and strength. The urine had a specific gravity of 1040, and contained a large proportion of sugar. Under a strictly regulated diet, in conjunction with the administration of codeine, $\frac{1}{2}$ grain (0.03 grammes) three times daily, there was speedy improvement, progressing to complete recovery, so that at the end of a month the codeine was withdrawn and ordinary diet resumed. Fenwick, of London,² has observed that influenza may evoke urinary lesions, such as acute inflammation of the kidney, bladder, and prostate. The majority of the cases presented inflammation of the neck of the bladder and of the adjoining surface of the prostate gland. In some cases there was sharp haematuria, which the electro-cystoscope, in a number of instances, demonstrated to proceed from submucous haemorrhages of the bladder, and in two instances from villous growths that had been called into activity by the acute illness. A certain number of cases presented atony of the bladder, in consequence of overdistension, which had passed unnoticed while the patient was delirious. It was observed that influenza also increased the severity of any pre-existing urinary disease, though usually the exacerbation was but transitory. An attack often proved a touch-stone of real value in detecting any weak point or predisposition to disease in the urinary tract. As a rule, as soon as the influenza subsided, the urinary disease also abated; but in some rare cases obstinate genital neuralgia remained, indistinguishable in its clinical features from that induced by onanism, tabes, or by severe malarial or septic intoxication.

Poore, of London,¹⁰⁷⁷ makes reference to three cases of influenza in which haematuria occurred. In all, it is believed, there existed some vulnerability of the kidneys acting as a predisposition to the occurrence of haemorrhage.

Chambrelent, of Bordeaux,¹⁸⁸ has reported the case of a woman, eight months pregnant, who was seized with an attack of influenza of the gastro-intestinal type, attended with diarrhoea, but without hyperpyrexia. The heart-sounds could be heard, though they were feeble. After the lapse of a week premature labor set in and a macerated foetus was born, presenting an appearance as if it had been dead for about the period that had elapsed from the attack of influenza.

Mangelot^{2016; 243} divides the pleural complications of influenza into six varieties: (1) dry pleurisy; (2) subpleural oedema; (3)

serous pleurisy; (4) hæmorrhagic pleurisy; (5) protopathic purulent pleurisy; (6) suppurative pleuro-pneumonia. The dry and the sero-fibrinous pleurisies are characterized by their development in the period of defervescence, and by the variability of the stethoscopic phenomena. Hæmorrhagic pleurisy and protopathic purulent pleurisy are comparatively uncommon, while suppurative pleuro-pneumonia is comparatively common. Rendu, of Paris,^{14 June 11} has reported two cases of influenza complicated by broncho-pneumonia, in which sudden death took place without appreciable cause. The one occurred in a woman, 50 years old, who had previously been robust and in good health. On the fourth day of an attack of influenza of pulmonary type, as convalescence appeared about to set in, the heart was discovered to be irregular. In a short while cyanosis abruptly developed, the heart failed, and death took place. The second case occurred in a woman, 42 years old, who, on the eighth day of an attack of influenza, complicated by broncho-pneumonia at the base of the right lung, was suddenly seized with syncope. In the absence of adequate cause, and from a knowledge of the effects of the influenzal poison upon the nervous system, the conclusion is arrived at that the heart-failure resulted from paralysis of the vagus, and that the asphyxia was of bulbar origin.

Hull, of Lakewood, N. J.,^{451 Jan.} has reported a case of influenza, complicated by pneumonia, in a woman 25 years old, in which the pulse during a period of eleven days, alternately, rose and fell irregularly between the limits of 40 and 110, pulse-beat and heart-beat being synchronous. Recovery ultimately ensued.

Orlandos, of Athens,^{791 No. 32, 92; Mar. 4} ⁷³ has reported the case of a man of 37, in whom, shortly after an attack of influenza, pneumonia developed and ran its course in eleven days. As convalescence was about to set in, the man was seized with intense pain in the right lower extremity, which, upon examination, was found to be livid and covered with petechiae. In a short time the part became greatly swollen and exquisitely tender, particularly in the course of the saphenous and femoral veins; and large bullæ formed. The œdema extended upward to the margin of the ribs. The function of the bladder was in abeyance for three months. Absolute rest was enjoined and inunctions of mercurial and belladonna ointment were practiced. Under this treatment some progress was being

made, when suddenly the patient was awakened from sleep by intense dyspnœa, accompanied by a sense of great anxiety, profuse sweats, chills, small pulse, and pallor. The condition yielded to stimulation, but for several days there was annoying cough with fibrinous expectoration. Shortly after this left-sided pleurisy developed. As final complications there occurred, successively, thrombosis of the left femoral vein and inflammation of the right basilic and pulmonary embolism. Notwithstanding these, the patient, after an illness of four months, entered upon convalescence and recovery followed.

Of 2000 cases of aural disease observed by Kosegarten, of Kiel, ³⁴⁴ _{Dec. 92; Apr.} 97 of the patients attributed the condition to influenza. In only 3 were the symptoms very severe. In none was haemorrhage into the membrana tympani observed. The attic was exclusively or chiefly affected in a remarkably large number. In cases in which the inflammation was confined to the attic, Shrapnell's membrane was intensely congested and swollen, sometimes bulging in a saccular form. The congestion extended to the adjacent part of the upper wall of the meatus. The vessels of the malleus were moderately injected, but the rest of the membrane was normal, with the exception of a slight loss of lustre. Puncture of the membrane of Shrapnell gave exit to a quantity of viscid and usually sanguineous fluid.

Schell, of Terre Haute, ⁵⁶ _{Feb.} has reported the case of a man, 61 years old, in whom, two or three weeks after recovery from an attack of influenza, the glands of the neck were observed to enlarge, and soon afterward other glands in various parts of the body became similarly involved. On examination of the blood, it was found that there were 3,500,000 red corpuscles to the cubic millimetre and about 1 colorless cell to 80 red. There was palpitation of the heart, and haemic murmurs could be heard on auscultation. The pulse and respiration were accelerated. Headache was frequent, and there was occasional vertigo. The area of splenic percussion dullness was augmented. Eye-ground and urine presented no abnormality. Death occurred in a short time as a result of pneumonia. No post-mortem examination was made.

Lémière and Didier, of Lille, ²²⁰ _{Nov. 11, 92} report a fatal case of influenza in which, several days before death, a generalized polymorphous erythema developed. In sections of the affected tissue they were

able, post-mortem, to demonstrate the presence of micro-organisms that they believed to be pneumonia cocci.

Curtin and Watson, of Philadelphia,^{451 Jan.} consider the action of influenza upon the heart, and report the results of a study of the angina pectoris of influenza. In the old they particularly observed intermittence with irregularity, while in the young a condition of simple heart-weakness seemed to predominate. Blueness of the lips was a common symptom. The majority of cases were characterized by diminished frequency of the action of the heart; rapidity of action was observed in but a small number. Many cases presented syncope. In old persons with angina pectoris sudden death was quite common; cases in gouty individuals were particularly prone to terminate in this way. In the young and vigorous, anginal symptoms were common, but death was seldom a result.

Roland^{14 Jan. 8} has reported the case of a smith, 31 years old, of robust constitution and without hereditary predisposition, who, on resuming work after an attack of influenza, was seized with pain in the right upper extremity. The hand soon became pale, then livid, and pulsation could not be perceived in the radial and also in the brachial artery. Finally, the fingers and the distal half of the hand presented the characteristic black of gangrene of arterial origin. A line of demarkation formed, and it was thought that the patient would recover; but the right foot became involved, and death supervened. Morlat and Rogier^{14 May 24} report the case of a chlorotic girl, 18 years old, who, during convalescence from an attack of influenza of moderate intensity, was suddenly seized with sharp pain in the calf of the right leg, and eight days after with similar pain in the calf of the left leg. Both extremities became pale and edematous, and otherwise presented evidences of phlebitis. In a short time moist gangrene set in upon the left side and led to a fatal termination a month afterward.

Leyden, of Berlin,^{69 Nov. 10, 92} has reported the case of a girl, 20 years old, who, four weeks after an attack of influenza, presented a suppurating angina. A week later, in the morning, on rising, she felt a sharp pain in the left hand, which, toward evening, was observed to be pale. In the course of a few days the pallor gave way to cyanosis, with which was associated a sense of coldness and weakness. The discoloration extended to the forearm and to the lower third of the arm, and swelling became superadded. There

was some pain and retardation and enfeeblement of movement. There appeared to be slight hyperesthesia. It was found that the left radial pulse was absent at the wrist; neither could pulsation be felt below the middle third of the arm; while below, a cord-like mass could be made out. On physical examination no lesion of any organ could be detected. The urine contained neither albumen nor sugar. There was an absence of febrile symptoms. The family history and the personal history were good. In the absence of a cardiac lesion or other disease, the conclusion was arrived at that the condition must be dependent upon the spontaneous formation of an arterial thrombus, as a sequel of influenza, from the breaking down of the colorless corpuscles of the blood. For several days the thrombosis extended and the symptoms became more pronounced, but subsequently the conditions moderated, until perfect recovery finally ensued; the occlusion of the brachial artery, however, persisting, and a collateral circulation being established. A second case is reported as having occurred in a medical man 50 years old. Shortly after an attack of influenza, symptoms of occlusion of the popliteal artery appeared, for the relief of which amputation became necessary. After a protracted convalescence, retarded by numerous complications, the patient ultimately recovered. In this case, also, there was no cardiac lesion, and the family and personal history were good.

Immunity.—As the result of an investigation carried on in the laboratory of Tizzoni, at Bologna, Alessandro ⁶⁹_{No. 32; Sept. 19} has found that rabbits can, by inoculation, be rendered immune to cultures of the bacillus of influenza. The highest degree of immunity is conferred through blood-cultures carefully filtered. The serum of such protected animals is antitoxic rather than bactericidal. The serum of vaccinated animals possesses the property of conferring immunity to influenza upon other animals in the proportion of $\frac{1}{2} \text{ to } \frac{1}{4}$ or less for every gramme (15 grains) of body-weight. The serum of immune animals also possesses curative properties.

Treatment.—Upon the basis of the infectiousness of influenza, and the disinfectant properties of the chlorides, Elwert, of Reutlingen, ¹³³_{Jan.} has adopted the following line of treatment: For adults he prescribes hydrargyri chloridi corrosivi, 0.02 to 0.03 grammes ($\frac{1}{3}$ to $\frac{1}{2}$ grain); sodii chloridi, 0.10 grammes (1 $\frac{1}{3}$ grains); morphinæ

sulphatis, 0.02 to 0.03 grammme ($\frac{1}{3}$ to $\frac{1}{2}$ grain); aquæ destillatæ, 150.0 grammes ($4\frac{1}{2}$ ounces); syrapi aurantii corticis, mucilaginis gummi arabici, $\ddot{\text{a}}$ 20.0 to 25.0 grammes (5 to $6\frac{1}{2}$ drachms). M. Sig.: Take a tablespoonful every four or five hours. If diarrhoea exist, 15 drops of tincture of opium may be added to each dose. For children the following combination is prescribed: hydrargyri chloridi corrosivi, 0.005 grammme ($\frac{1}{2}$ grain); sodii chloridi, 0.05 grammme ($\frac{1}{8}$ grain); aquæ menthae piperitæ, 70 to 80 grammes ($2\frac{1}{4}$ to $2\frac{1}{2}$ ounces); syrapi simplicis, mucilaginis gummi arabici, $\ddot{\text{a}}$ 25 grammes ($6\frac{1}{2}$ drachms). M. Sig.: Take a teaspoonful every one or two hours. In case of sleeplessness, pain, or diarrhoea, a small amount of tincture of opium may be added to each dose. Of the following solution a portion is used twice or thrice daily by atomization in the nares and as a gargle: hydrargyri chloridi corrosivi, 0.03 grammme ($\frac{1}{2}$ grain); aquæ destillatæ, 50.0 grammes ($1\frac{1}{2}$ ounces). M. Sig.: To a portion, add an equal amount of warm water. This solution may also be employed prophylactically to advantage.

In the treatment of the cardiac complications of influenza Curtin and Watson, of Philadelphia, ⁴⁵¹ found alcohol of the first importance in cases of simple heart-failure. Caffeine citrate and cactus grandiflora proved next in value. Digitalis and strophanthus were also of use; while atropine seemed to exercise a special influence for good. Nitro-glycerin appeared to act well in the aged and in gouty cases at any period of life. Strychnine was often of great service. In cases marked by anaemia, hypophosphites, iron, arsenic, quinine, and strychnine were employed. In chronic cases codliver-oil proved useful.

ENTERIC FEVER.

Incidence.—Mouser, of San Francisco, ¹⁴⁷ gives the outcome of an investigation of an epidemic of enteric fever observed at Oakland, Cal. The first case occurred in a man connected with a dairy situated a short distance from the city, and from which many families in Oakland derived their supply of milk. A second dairyman was attacked soon after the first. Some quarrymen working in the vicinity of the dairy and not using the milk, but drinking the water that was used for washing the cans, were also attacked and one of them died. After the lapse of a month a number of

cases appeared in Oakland, and on inquiry it was learned that all had been using milk from the infected dairy. The epidemic now spread with great rapidity, 362 cases being reported in the course of a month. Of this number 228 were certainly known to have been patrons of the suspected dairy. In 22 cases the source of supply could not be ascertained, and the remainder were supplied from thirty-four dairies. Investigation showed that the water-supply of the dairy was received from a small stream coming from the hills and flowing through cow-pastures. As well as could be ascertained, there were no habitations near the creek above the dairy. On a little hill, within a few feet of the creek, was a small house, in which it was said there had been a case of enteric fever. The dejections had been thrown out upon the ground in close proximity to a small dam in the creek, from which a pipe supplied a large tank, situated perhaps seventy-five feet below. From this tank all of the water used for the purposes of the dairy was drawn. Another case of fever was said to have occurred in a small house farther from the water-supply, where drainage was not likely to affect it. Below the dam was a pool in the bed of the stream into which had been thrown several dead animals. In the immediate vicinity of the tank was a well, from which the supply of water was obtained when the water in the creek fell. Organisms corresponding with the typhoid bacilli of Eberth were found in the water above the dam, of the pond below the dam, and of the tank. Goyon, Bouchereau, and Fourmal⁴¹³ Nov., '92 report the occurrence of a limited epidemic of enteric fever due to the use of infected milk. The first cases were observed in a dairyman and his wife. Subsequently the disease assumed an epidemic character, only attacking those, however, who used the milk from the dairy of the farmer who was first ill. Inquiry disclosed the fact that the grossest carelessness was used in the disposal of the discharges from the dairyman and his wife. The dejecta, undisinfected, were thrown upon a manure-heap close to a well, the water from which was used for rinsing the vessels in which the milk was received. The soil was porous, and there can be no doubt that the water was thus infected, and it in turn infected the milk. It was not possible, however, to demonstrate the presence of typhoid bacilli in the water.

Pfuhl, of Berlin,⁵⁸ May 12 gives the results of an epidemiological

study of an outbreak of enteric fever in Landsberg, in the first cases of which the infection was obviously transmitted by the air, and in the later cases through the drinking-water. The source of water-supply was at once cut off and the epidemic soon came to an end. Examination of the water made at a later date disclosed the presence of colon bacilli, but not typhoid bacilli. This indicated that the water had been contaminated by dejecta. The water also contained an excess of sulphites, of chlorine, and of oxidizable matters. Osler, of Baltimore,³⁹ May has reported a remarkable house-epidemic of enteric fever lasting for four months, and in the course of which ten persons in one household were attacked and four died. Priestley, of Leicester,⁶ Jan. 21 states that a child, with enteric fever, occupied a room in which herb-beer was being brewed. Subsequently 19 additional cases developed in the borough. On careful investigation it was learned that in 15 of these cases the herb-beer had been drunk, but in the remaining 5 the information was not so definite. All other possible sources of infection were practically excluded.

West, of Fort Worth, Texas,¹⁴³ Oct., '92 observed a case of enteric fever in an infant 10½ months old, and a second case in a woman 101 years old. In both cases recovery ensued. The first lasted twenty-one days; the second twenty-five days.

Bacteriology.—Of 241 cultures made by Loison, Simonin, and Arnaud,⁹² April 10 of blood obtained from the finger in 66 cases of enteric fever, 101 were successful. Staphylococci alone were found in 45 cases; typhoid bacilli in 1; typhoid bacilli, associated with staphylococci, in 3; bacilli coli communes, associated with staphylococci, in 1. Of 41 cases in which the urine was examined albumen was found present in 2. Of 74 cultures made from the urine (from 34 cases), 54 yielded positive results. Staphylococci were found in 20 cases; typhoid bacilli in 2; typhoid bacilli and staphylococci in 6; staphylococci and streptococci in 3; staphylococci and bacilli coli communes in 1; typhoid bacilli, streptococci, and staphylococci in 2. In 3 cases complicated by abscess of the cheek, bilateral suppurative parotiditis and a gangrenous carbuncle of the back, respectively, staphylococci were found; in a fourth case, complicated by suppurating parotiditis, typhoid bacilli were found, in association with staphylococci. Of 3 cases that presented whitish deposits about the tonsils or the anterior pillars of the fauces, culture dis-

closed the presence of staphylococci only in 1; of a mixture of staphylococci and streptococci in the second; and of bacilli coli communes in the third. In three cases in which previously there had been no urethritis, a copious discharge of whitish pus from the urethra set in between the twentieth and the thirtieth day, lasting only for a few days and subsiding without any special treatment. In one of these cases the urine at this time contained typhoid bacilli, while the discharge contained both typhoid bacilli and staphylococci. In the other two cases the urine contained typhoid bacilli and staphylococci, while in one of these the discharge contained typhoid bacilli and staphylococci, and in the other staphylococci and streptococci. A urethral discharge was observed in one other case in which there had previously been an imperfectly cured urethritis. In 10 fatal cases examinations were also made of blood obtained from the spleen, the liver, and the heart in 9, with positive results. Typhoid bacilli were found in 8 cases; twice alone, twice associated with staphylococci, once with streptococci, once with both staphylococci and streptococci, once with both bacilli coli communes and staphylococci, and once with both bacilli coli communes and streptococci. In the ninth case bacilli coli communes were found in association with staphylococci. Analysis showed that in examinations made early in the attack typhoid bacilli were most commonly found, while in later examinations streptococci preponderated, and the conclusion is reached that the pyrexia observed during the first ten or fifteen days is due to the activity of typhoid bacilli, while that observed subsequently is dependent upon the activity of staphylococci.

Vincent²⁶² has found that secondary infection by streptococci is comparatively frequent in cases of enteric fever complicated by secondary suppurations, such as localized periostitis; and he insists upon the exceptional gravity of these complications, from the danger of the streptococci becoming disseminated throughout the body. Complications dependent upon the presence of staphylococci appear to be much less dangerous. Of 41 cases of enteric fever presenting abscesses or other forms of suppuration, the secondary lesions in 32 were due to the presence of either the staphylococcus pyogenes aureus or to mixed infection by the staphylococcus aureus and staphylococcus albus. In all of these cases recovery ensued. In 8 cases streptococci, either alone or in

association with the typhoid bacillus of Eberth, were isolated from the purulent focus. Death occurred in 5 of these. Experiments upon animals confirm the opinion as to the peculiar gravity of the association of streptococci and typhoid bacilli. While active phagocytosis took place after the injection of typhoid bacilli alone, no such phagocytosis could be observed after injection of typhoid bacilli and streptococci. Clinically, the detection of streptococci in the secondary lesions of a case of enteric fever should be regarded as a sign of grave import and an indication for immediate and energetic interference. In order to diminish the risk of these secondary infections, rigorous attention should be bestowed upon the hygiene of the skin.

Du Cazal, of Val de Grace, ¹⁴ April, saw a patient who presented the classic symptoms of enteric fever, including a profuse eruption of rose-spots. Death took place as a result of bilateral pneumonia, which made its appearance on the fifteenth day of the primary affection. Upon post-mortem examination no lesion of the intestinal tract could be discovered, but the enlarged spleen contained virulent typhoid bacilli in large numbers.

Malvoz, of Liége, ⁸⁴⁸ v. II, nos. 5 in an elaborate study, points out the difficulties in the way of definitely accepting the differentiation of the bacillus of Gaffky and Eberth (typhoid bacillus) and that of Escherich (bacillus coli communis), as well as of accepting the specificity of either organism. He takes the ground that the apparent differences—morphological and biological—between the organisms may depend upon extrinsic influences, and that they may be artificially removed.

Symptomatology.—Ouskow ¹¹⁰¹ v. 2, nos. 1 has made a study of 439 fatal cases of enteric fever among a total of 6513 cases seen at St. Petersburg in the quinquennial period from 1886-87 to 1890-91. The cases were divided, according to season, as follows: There were 1713 during summer, 1356 during autumn, 1704 during winter, and 1740 during spring, the mortality being, respectively, 5.1 per cent., 4.5 per cent., 6.6 per cent., and 7.1 per cent. The largest number of deaths occurred in spring. Thus, of 100 deaths, 30.8 occurred in spring and 15.5 in autumn. Throughout the various seasons of the year a parallelism existed between the general mortality and the mortality from enteric fever. Of 39 fatal cases of enteric fever with relapse, 12 occurred in autumn.

and 10 in spring. Twelve deaths occurred from perforation of the bowel in autumn and 5 during spring. Complications were observed in 18 fatal cases that occurred during autumn and in 39 that occurred in spring. The conclusion is reached that the increased mortality of spring depends upon the character of the disease and upon the attendant complications. The character of the disease depends upon the virulence of the infection and the resistance of the individual. In the majority of fatal cases the mucous membrane of the pharynx was deeply reddened, in places denuded of its epithelium, and at times covered with a dirty-grayish membrane more or less readily detached. The tonsils were swollen, and presented an appearance suggestive of a diphtheric process in 22 cases,—5 per cent. In 4 cases there was deep ulceration, and in 2 a phlegmonous process. Ordinarily the ulcers were not limited to the pharynx, but extended into the fossa pyriformis laryngis. The stomach ordinarily presented evidences of a more or less pronounced catarrhal condition. Characteristic lesions were found throughout the intestinal canal. In 39 cases the follicular apparatus of the large intestine was greatly swollen; in 29 cases ulceration was found, in 1 case not only throughout the entire intestinal canal, but also in the ductus choledochus. In 2 cases of perforation of the bowel an ascaris lumbricis was found in the peritoneal cavity. There were 2 cases of acute peritonitis in which perforation could not be discovered. In 2 the only cause that could be found for an acute peritonitis was necrosis and rupture of a mesenteric gland. Four cases were observed in which the softened spleen had ruptured into the peritoneal cavity without causing peritonitis. Three kinds of colorless blood-corpuscles are distinguished: old elements, of which there are normally 75 per cent.; new elements, of which there are 18 per cent.; and mature elements (with one large nucleus), of which there are 7 per cent. In cases of enteric fever these proportions are changed, so that there are, respectively, 50 per cent., 30 per cent., and 20 per cent. The total number of colorless corpuscles is diminished. In about 30 per cent. of the cases ulceration of the larynx was found; none in the first week. Of cases dead in the second week, 79—15 per cent.—presented ulceration of the larynx; of those dead during the third week, 144—37 per cent.—presented laryngeal ulceration; of those dead in the fourth

week, 89—39 per cent.—presented ulceration. In 1 case there was extensive ulceration of the trachea. In about 8 per cent. of the cases lobar pneumonia existed. Haemorrhagic pleurisy was observed in 9 instances; 2 of these were cases of general haemorrhage. There were 11 cases of purulent pleurisy; 1 was secondary to gangrenous bronchitis, 5 to suppuration of the connective tissue of the posterior mediastinum, and 1 was a case of pyæmia. Two cases were attended with partial necrosis of the lung and pneumothorax. Fatty degeneration of the heart was found in 42 cases. Endocarditis existed in 3. In 3 cases polypi were found in the heart; in 12 pulmonary infarcts were found. In 1 case a thrombus occluded the left iliac artery, in another the right jugular vein was similarly obstructed, and in 1 an infarct was found in a small artery of the right kidney. All these cases had reached the fourth or fifth week. In 1 case the entire serotum became gangrenous; in another, the labia majora; in still another, the sole of the foot, as well as the gum of the right side of the lower jaw. Fourteen cases presented abundant intestinal haemorrhage, 4 being cases of general haemorrhage. In 13 cases fatty degeneration of the kidneys was observed. In a number of cases nodular aggregations of bacilli of enteric fever were found in the kidneys. One case presented basilar meningitis, 1 softening of almost the entire left frontal lobe of the brain, and 1 diffuse capillary haemorrhage. Haemorrhage into the spinal cord was observed in a considerable number of cases, and was especially noted in the second week, principally in the anterior horns, and rarely in the columns of white matter. The mucous membrane of the uterus was usually thickened, friable, and injected, and sometimes the seat of haemorrhage. In only 1 case was abortion observed. The complications were as follow: Croupous pneumonia, 44; parotiditis, 17; phlegmons (of various organs), 13; relapsing fever, 1; erysipelas, 16; diphtheria, 2; pyæmia, 7; otitis, 6; gangrenous bronchitis, 3,—25 per cent. Of these, 86, or 19 per cent., died as a result of the complicating affection.

Hessert⁷⁷⁹ gives an analysis of 366 cases of enteric fever under observation in Cook County Hospital, Chicago. Of the total number 97 (about 27 per cent.) were in females. The distribution according to age was as follows: Under 15, 6 cases; between 15 and 25, 181; between 25 and 35, 132; between 35 and 45, 26;

between 45 and 55, 11; between 55 and 65, 2; not known, 8. There were 48 deaths (13.1 per cent.), distributed as follows: between 15 and 25, 21; between 25 and 35, 14; between 35 and 45, 6; between 45 and 55, 1; between 55 and 65, 2; not known, 4. The duration of the individual attack varied from three to five weeks. An undoubted eruption of rose-spots was observed in 136 cases (37 per cent.). A young negro, of chocolate hue, presented a typical eruption, the spots being somewhat faint, but characteristic. Enlargement of the spleen was always demonstrable by percussion or palpation, unless obscured by distension of the stomach or intestines. It could frequently be palpated when the percussion-note in the usual situation of the spleen was tympanitic. The spleen could be plainly felt in 43 per cent. of the cases, palpation being prevented in many cases by tenderness, tympany, or rigidity of the abdominal walls. Delirium was noted in 32 cases (9 per cent.); it was mostly of a low, muttering type, rarely maniacal. Tympanites to a degree sufficient to warrant treatment was noted in 15 cases, and was, as a rule, readily controlled by the usual remedies. In 2 cases, however, which terminated fatally, it was excessive and obstinate. Excessive diarrhoea was observed in 17 cases, although constipation seemed more commonly to prevail. Vomiting was common among the females, but rarely so severe as to unfavorably affect the general condition. Haemorrhage from the bowels, more or less copious, occurred in 28 cases (7.6 per cent.); of this number, 16 terminated fatally. Perforation of the bowel occurred in 4 cases (a little more than 1 per cent.); 3 of these terminated fatally. Croupous pneumonia appeared in 6 cases, of which 2 terminated fatally. Crural thrombo-phlebitis was observed in 7 cases; nephro-typoid in 3; bilateral parotiditis in 1; herpes labialis in 1; splenic leukaemia in 1. In 2 cases there was an absence of febrile elevation of temperature; 1 of these terminated fatally, and the autopsy disclosed the presence of typical ulceration and enlargement of the spleen. Elevation of the temperature, after it had partially or wholly subsided for a variable period, accompanied by an aggravation of the local and general symptoms, was noted in 20 cases, but in not more than half of these did the recrudescence correspond with von Ziemssen's definition of a relapse. The treatment consisted in the administration of an absolute liquid diet, either milk (peptonized or not), strained oatmeal-

gruel, or soups; a sponge-bath was given when the temperature reached 103° F. (39.5° C.), and an enema every second day if the bowels were constipated. Sponging was practiced with cold or warm water, sometimes with the addition of alcohol, the patient being wrapped in a wet sheet and sometimes covered with blankets. The hot pack was employed, as was also rubbing with ice. On a few occasions full cool baths were given; and in some instances the patient was left in a pool of cool water in a bed covered with a rubber sheet. All of the cases received the treatment outlined, while one-half received, in addition, from 5 grains (0.32 grammes) to 15 grains (1 gramme) of salol every four hours. Besides, an initial dose of calomel was given in every case. No definite conclusions could be drawn from a comparison of the results in the two sets of cases.

Richardson, of London,⁶⁷³ refers to cases presenting a group of symptoms that ultimately prove to be instances of enteric fever, but which in the beginning appear to be either meningal or pneumonic. Thus, a man, in perfect health when he went to bed, was suddenly awakened in the night by the crash of his bed-room window-panes, followed by violent knocking at the door of his house. He awoke, feeling as if he were stunned by the noise and alarm; he became sick and giddy, and soon was rendered semi-delirious from extreme pain within the skull. In a few hours he presented 4 degrees of fever on Fahrenheit's scale (2.2° C.), a tongue furred, with red margins and tip; great thirst, and extreme restlessness. Within forty-eight hours the symptoms passed generally into those of true typhoid, with well-marked lenticular cutaneous rash, and with intestinal derangements of the most typical character. This condition is called typhoid, but the qualification traumatic is added. It is explained as being from the first the result of a nervous shock, probably of the sympathetic system, followed by a reaction in which the digestion was modified, and upon which the specific disease was developed, as if from a toxic product generated in the alimentary canal.

Another example, of a somewhat different kind: A healthy man reclined on the bank of a lawn in the warmth of summer. He half-slept or dozed, and suddenly awakened with the fact before him that he was breathing a foul air. He looked about and learned that he had been resting close to the mouth of a cess-

pool. He felt sick, was giddy, retched, was conscious of some intestinal pain, with eructation, and soon was seized with acute headache, fever, and delirium. In six hours he was definitely in fever, with some difficulty of respiration and hacking cough. Evidence was found of pneumonia at the posterior base of both lungs, but the clear indications of enteric fever were most striking. In forty hours the lenticular rash was developed, and in the end enteric fever of unmistakable character was presented.

It is believed that these classes of enteric fever (as distinct from those in which there is an incubation period following upon some real or assumed toxic material taken as food or drink) are of far more common occurrence than is usually supposed. They are cases of nervous origin, and are supposed to commence within the body without any introduction of specific virus. Whether they become themselves contagious, by elimination of toxic products, is not sure, but the probability is strongly in favor of that view. All the symptoms that lead to what is called "typhoid" indicate its nervous origin. The disease is to be considered a paresis, affecting the intestinal sympathetic nervous system. There seems to be no other way of accounting for the lenticular rash and for the distinguishing aberrations connected with the digestive system. The fever is as the radiation from relaxed vessels surcharged with blood. The exhaustion is exhaustion due to the dissipation of radiant vital heat, and, if there be a modified zymosis, owing to the presence of fermentative substance, that would mean a substance itself generated by the nervous disturbance.

Filipovich, of Odessa, ^{Aug 19}⁶, has observed, in all of the cases of enteric fever that came under his notice in the course of two extensive epidemics, a peculiar induration and yellowish or orange tint in the prominent portions of the plantar and palmar surfaces, instead of the reddish color in healthy subjects, or the bluish tinge encountered in cyanotic patients. This peculiar appearance is accounted for by the enfeebled action of the heart, the incomplete filling of the capillaries, and the dryness of the skin. The sign was so constant and so well marked that it is believed that in a doubtful case it may afford material assistance in diagnosis. The phenomenon has also been observed by Skibnevski, of Moscow. An editorial writer ^{Oct 24}⁹ states that this sign has long been known to many physicians, whose attention was called to it by the late Dr. Ellwood

Wilson. In some observations made at the Philadelphia Hospital during a number of weeks, examination of the hands and feet of every fever-patient disclosed the presence of the sign in every case of enteric fever, and its absence from all other cases of febrile disease, with the exception of one case of acute tuberculosis and one of acute pneumonia. In neither of these exceptional cases was the discoloration so marked as in the enteric cases. The sign is, however, not invariably well marked, even in cases of enteric fever. The opinion is ventured that, while not pathognomonic, the sign is interesting and should count with others in making a diagnosis.

Laveran¹⁴ July 23 has reported three cases of enteric fever in which the characteristic lesions were present in a pronounced degree in the large intestine. In one case the follicles throughout the entire length of the large bowel were in a state of infiltration, without ulceration; in the second case there were numerous points of confluent ulceration; and in the third the ulceration had reached a more advanced stage, even having given rise to perforation. It has been stated that, clinically, involvement of the large intestine in the course of an attack of enteric fever is to be recognized by the seat of the pain induced upon pressure, by the degree of meteorism, and by the copiousness of the diarrhoea. In one of the cases reported the pain was intense and referred to the left hypochondrium, but there existed a peritonitis, at first local, but later general. In none of the cases was the diarrhoea excessive. In only one was the meteorism pronounced. In this the distension was more marked above than below the umbilicus, and followed the course of the colon, which after death was found greatly distended and perforated. Rendu¹⁴ July 23 also refers to two cases of enteric fever in which only the mucous membrane of the large intestine was involved in the inflammatory process. In one of these meteorism was present, but without noteworthy diarrhoea. Hanot¹⁴ July 23 has related three cases of the kind under his observation, none of which presented dysenteric stools.

Rogers, of St. Paul, Minn., ¹⁰⁵ Dec. 1, 192 describes a case of enteric fever attended with subnormal temperature in a colored boy 18 years old. Although at the outset the temperature reached 103.4° F. (39.7° C.), it soon declined to 95.2° F. (35.1° C.), and during fourteen days fluctuated between this and 99° F. (37.2 C.). On the fifteenth day, through a misunderstanding, the patient was

given soft-boiled eggs, toast, and oatmeal, and the temperature rose to 102.5° F. (39.2° C.), but on the following day it had again fallen to 97.2° F. (36.2° C.). Suitable treatment was followed by recovery. Dreschfeld, of Manchester, Eng.,¹⁵ has reported four cases presenting symptoms and physical signs of enteric fever, but without elevation of temperature. One of the cases terminated fatally, and in another it is thought that perforation of the bowel took place. Laroussinie¹⁶⁴ observed a case in an insane patient presenting anomalous symptoms. There were vomiting, meteorism, somnolence, constipation, elevation of temperature, and slight bronchitis; but no epistaxis, and no gurgling or iliac pain. The spleen was enlarged and the tongue coated. Two rose-spots finally appeared. The right side of the face presented evidences of vaso-motor derangement: the cheek was red; the pupil dilated. The pulse was frequent and small. The case terminated fatally, and the autopsy disclosed, in addition to the lesions of enteric fever, the existence of a meningo-encephalitis. Leahy, of Chicago,¹³⁹ describes the case of a man, 21 years old, in whom, in the third week of an attack of enteric fever, a copious discharge from the bowels took place, followed shortly by mild delirium. Two days afterward haemorrhage took place from the nose, eyes, and ears, and a day later from the bowels, succeeded by violent delirium, coma, and death. Chrétien¹¹ has, in three cases, been able to confirm the observation of Bouchard that excessive dicrotism of the pulse is a prodrome of intestinal haemorrhage. In explanation of this fact it is pointed out that the arterial tension is heightened at the time that the haemorrhage is about to occur.

Kiener and Viillard, of Montpellier,¹⁴ have reported a fatal case in which enteric fever and acute tuberculosis existed simultaneously. At the post-mortem examination the lesions of an acute, disseminated, granular tuberculosis were found in lungs, pleuræ, peritoneum, and pia mater; while the lower third of the ileum presented the typical ulceration of the third week of enteric fever. Bacteriological examination of material obtained by puncture of the enlarged spleen disclosed the presence of micro-organisms corresponding in all particulars with the bacilli of enteric fever.

Girode¹¹ refers to the rarity with which enteric fever and cholera are associated, and reports an illustrative instance in a man presenting the symptoms of cholera, comma bacilli being demon-

strable in the intestinal evacuations. Toward the close of the attack symptoms of ataxo-adynamic enteric fever appeared, which pursued an ordinary febrile course and was attended with ochrey diarrhoea and the presence of rose-spots. The stools contained typhoid bacilli, as did also the albuminous urine. Cold-bath treatment afforded transitory amelioration, but the patient died on the seventh day. Upon post-mortem examination the typical intestinal, mesenteric, and splenic lesions of the first stage of enteric fever were found, and typhoid bacilli were isolated in pure culture from the splenic juice. Moreaud²⁴³ has reported the case of a soldier, 23 years old, who had had an attack of measles a year before, but who, on about the fifteenth day of an attack of enteric fever, presented elevation of temperature, catarrhal manifestations, a coarse macular eruption, and other symptoms of measles. The morbillous eruption began to disappear in the course of four or five days, when the rose-spots of the primary disease again came into view. Deservescence, however, took place in a few days, and the attack soon terminated favorably.

Complications and Sequela.—Hawkins, of London,^{6 July 29} has made an analysis of 251 cases of enteric fever in children from 2 to 15 years of age, with special reference to the occurrence of intestinal perforation. Of 20 fatal cases perforation occurred in 6. In adults this occurred in 18 cases among 43 that ended fatally. Of the 6 cases of perforation in children 2 were 5 years old, 1 was $7\frac{1}{2}$, 2 were 9, and 1 was 14. Of the 18 cases in adults 2 were between 15 and 20, 6 between 20 and 25, 2 between 25 and 30, 4 between 30 and 35, 2 between 35 and 40, and 2 were 43 years old. Of the 6 cases in children 5 were in males, 1 in a female. Of the 18 cases in adults 10 were in males, 8 in females. That ulceration is not uncommon in children is demonstrated by the fact that, in an investigation of 17 post-mortem examinations, ulceration was found in 3 cases between 3 and 5 years of age, in 10 between 5 and 10, in 1 at 14, and 1 at 15. In the remaining 2 cases death took place on the ninth and fourteenth days, respectively, and no ulceration was found. To ascertain the seat of ulceration the reports of 192 post-mortem examinations were studied. It was found that the ileum was involved alone in 128 cases; in 3 of these small, newly-formed ulcers were found in the stomach, in 2 instances two separate ulcers being present. In the remaining 64 cases the

ileum was ulcerated in all instances, and together with the jejunum in 1, the cæcum in 12, the vermiform appendix in 4, and the colon in 47 (the ascending colon in 8, the transverse colon in 3, the descending colon in 2, and all parts of the colon in 34). In an analysis of the seat of perforation, as noted in 72 post-mortem examinations, it was found that the ileum was perforated in 61, at distances above the ileo-cæcal valve varying from one inch to six feet, in the majority of cases at distances of six inches, twelve inches, and twenty-four inches. Of the remaining 11 cases the colon was perforated in 5, the cæcum in 3, and the vermiform appendix in 3. Of the cases in which the colon was involved the perforation was seated in 1 in the ascending colon, an inch above the cæcum (in this case the ileum also was perforated), in 1 in the transverse colon, and in 3 in the descending colon (in 2 in the upper part and in 1 in the sigmoid flexure).

McCall, of Conisborough, Eng.,^{2 July 8} has reported a case in which he believes perforation of the bowel to have taken place, with ultimate recovery. The patient, a woman 34 years old, had been nursing her son during an attack of enteric fever. On the sixteenth day of her illness she went into collapse, and presented the phenomena of impending death, together with marked tympanites and great tenderness over the cæcum. The symptoms yielded, however, to active stimulation and artificial warmth. Dullness over the cæcum persisted for some time, and for a brief period there was also some dullness in the flanks. Later in the attack fluctuation became evident in the cæcal region, and subsequently the patient passed an eggcupful of pus by the bowel. Six days afterward 18 ounces (560 grammes) of badly-smelling pus, together with a considerable quantity of gas, were removed, by means of an aspirator, from the area of cæcal dullness. Six days later 8 ounces (250 grammes) more of pus were removed. After this the woman made an excellent recovery and was restored to her usual health.

Symes, of Dublin,^{16 Apr.} observed a case in a married woman, who was a cook in a large house in which the sanitary arrangements were markedly deficient, the soil-pipes passing to the main drain through the kitchen and dairy, the former close to the fire and the latter beside the milk-pails. The pipes were not ventilated and sewer-gas also leaked into the house through the sinks, from which

the escapes directly entered the down-soil pipes. The woman suffered with "sick headache" and diarrhoea for a week before taking to bed. The fever was of malignant type and attended with low adynamic symptoms. For ten days there was incontinence and for three days delirium. The diarrhoea was not excessive, but the stools were extremely offensive. The most troublesome symptoms were headache, sleeplessness, and restlessness, which were efficiently relieved by freely leeching the temples. On the eighteenth day there was slight haemorrhage from the bowels. On the twenty-seventh day symptoms suggestive of the onset of pericarditis or endocarditis appeared, although no friction-sound or murmur could be detected. The question of perforation was also considered, but an absolute diagnosis was scarcely possible. In the course of the next few days phlebitis developed in both lower extremities, and chills occurred on several occasions. On the fifty-first day a fresh crop of rose-spots appeared. From the fifty-fourth day the fever gradually subsided by lysis. From the sixty-first to the ninety-second day a state of oliguria existed, the average amount of urine excreted daily being a little more than 10 ounces (310 grammes) and the average specific gravity about 1026. Albumen was found present on the sixty-third, seventy-third, seventy-fourth, seventy-fifth, and eighty-third days; hyaline, oily, and granular tube-casts on the seventy-eighth day; anasarca appeared on the sixty-seventh day. On the seventy-fifth and seventy-sixth days, the stools, washed and examined, were found to be composed almost entirely of shreds of intestinal epithelium, which floated on water. On the seventy-eighth day there was some haemoptysis proceeding from the apex of the right lung and recurring on the eighty-third day. Ultimately, after an illness of nearly three months, convalescence set in.

Hayes, of Dublin,^{16 Aug. 1} has reported a case of enteric fever in a man 20 years old, who came under observation on the tenth day of his illness. Four days later he had two sharp haemorrhages from the bowel. In the course of a week the temperature gradually began to decline, but convalescence was interrupted by a relapse. For a time diarrhoea was replaced by constipation, but on the twenty-fifth day diarrhoea reappeared, and was followed on the next day by two considerable haemorrhages. On the thirty-second day of the relapse the patient's gums began to bleed rather freely and blood

appeared in the urine. At the same time blood appeared in the intestinal evacuations, as if from continued oozing rather than from a perforated vessel. Previously and up to the appearance of the purpuric manifestations the patient had been taking 15 grains (1 grammie) of spirit of terebinth as a punch with brandy, but on the appearance of the haematuria the turpentine was withdrawn. After the purpura had persisted for several days, apparently uninfluenced by the administration of several haemostatic drugs, the turpentine was resumed, and almost immediately the haemorrhages began to decline and finally ceased. During a part of the course of the attack the temperature-curve exhibited well-marked variations of a malarial type, in addition to the usual diurnal variation of enteric fever. Each third day the temperature suddenly rose 3° or 4° F. (1.6° to 2.2° C.), and as suddenly sank to a level about that at which it had previously stood and remained there, with the usual daily variations, until the third day following, when the same large rise and fall took place. These extreme elevations of temperature were accompanied by a condition of severe rigor, lasting sometimes for a period of half an hour, the fall of temperature being accompanied by profuse sweating and collapse. This state of affairs lasted for fourteen days, the purpuric symptoms showing themselves at about the middle of this period. There was no previous history of malarial infection. Recovery ultimately took place after a tardy convalescence.

Debongnie, of Belgium,⁴⁵⁴ relates the case of a soldier who was apparently entering upon convalescence from an attack of enteric fever, free from complications, when rather a copious haemorrhage from the bowel took place. The patient complained of pain referred to the buttocks, and examination disclosed the existence of a soft, fluctuating tumor in the ischio-rectal fossa. An incision gave exit to pus and faecal matter. The inner opening of the fistula was found at a depth of from twelve to fifteen centimetres, the perforation being situated above the levator ani muscle. In view of the precarious condition of the patient, the abscess was treated by means of antiseptic irrigations. The wound appeared to be progressing favorably, when the patient began to pass gas by the urethra and the urine presented a faecal appearance and odor. By providing for a free discharge from the ischio-rectal wound, by means of the actual cautery and the gorget, the communication

between the bowel and the bladder closed, and, after a considerable time, the ischio-rectal fistula also cicatrized. It is believed that the haemorrhage and the ischio-rectal abscess were both the result of the presence of ulceration in the rectum. Vance, of Louisville,²²⁴ Aug²⁶ has reported the case of a girl, 9 years old, in which, in the seventh week of an attack of enteric fever, the umbilicus became tender, a little red, and pouting. Two weeks later a small opening appeared and a good deal of pus was discharged. Expectant treatment was employed for some time, but finally an exploratory operation was undertaken. An incision was made in the median line, from the umbilicus as a centre, and a large quantity of pus of pronounced faecal odor, together with some solid matter, was evacuated. The abdominal wall, from the ilium to the ribs, was entirely separated from the parietal peritoneum, and this surface was suppurating from the opening made back to the loins. The hand was introduced for the purpose of discovering the source of the trouble, but no intestinal perforation could be found. The whole area was thoroughly washed out and packed with iodoform gauze. Subsequently counter-openings had to be made and drainage-tubes introduced.

Eskridge, of Denver,²² Jan. describes the case of a man, 25 years old, in which, during convalescence, stiffness and pain in the sacral region was complained of. There was a previous history of syphilis and pains in various joints. The stiffness and pain disappeared after the patient began to be about, but returned when he resumed work as a hostler, and he was finally compelled to take to bed again. In addition to the sacral pain there was also pain referred to the left side of the pelvis. In walking the left foot was held in advance of the right, but in attempting to walk normally great pain followed on placing the left foot in front of the right, or on permitting the left to lag far behind the right. The pain appeared to be caused by attempts to put the flexors and extensors of the left thigh upon the stretch. Pressure over the first sacral spine gave rise to pain, shooting down the posterior aspect of the left thigh, in the area of distribution of the small sciatic nerve. Attempts to bring the straightened leg forward were attended with pain in the sacral region, in the left hip, and on the posterior aspect of the left thigh. On putting the leg backward the pain was referred to the sacral region. The knee-jerks were exag-

gerated, but ankle-clonus was absent. The left leg presented some hyperesthesia. An area as large as a silver half-dollar on the anterior aspect of the right thigh was anaesthetic. Upon simultaneous pressure upon both ilia pain was complained of in the left sacro-iliac joint, and extending from one side of the pelvis to the other. By excluding myelitis, sciatica, hip-joint disease, tumors of the pelvis, and malingering, a diagnosis of periostitis of the pelvic bones, perhaps associated with a localized pachymeningitis, in the sequence of enteric fever was made.

Grancher, of Paris, ¹¹ states that, in the case of a boy 12 years old, during the period of defervescence of an attack of enteric fever of not unusual character, suppurative synovitis developed at the instep. In the pus evacuated only the bacilli of enteric fever were found. In the course of a week manifestations of phlegmasia alba dolens appeared, from inflammation of the left saphenous vein. Finally, a relapse occurred. Recovery was, however, ultimately perfect. The phlebitis, like the synovitis, was ascribed to the presence of the bacilli of enteric fever. In the case of a child of 9, presenting symptoms of enteric fever, the frequency of action of the heart was greatly increased, and the rhythm partook of the character of that of the foetal heart,—modifications ascribed to a myocarditis depending not upon intoxication, but upon infection by the specific organisms of the primary affection.

Chantemesse and Widal, of Paris, ¹⁴ have reported the case of a woman, 42 years old, in which, during convalescence, fatal suppurative nephritis and perinephritis developed. A post-mortem examination could not be made, but the diagnosis seemed undoubted. During life there had been an appreciable swelling in the loin and uræmic symptoms; the urine was albuminous and purulent, and contained bacilli coli communes in almost pure culture.

Weintraud ⁴ has reported the case of a man, 19 years old, who had had a left-sided exudative pleurisy three years previously, and who, toward the close of the second week of an attack of enteric fever, began to show subjective and objective symptoms of pleuritic effusion. Exploratory puncture showed the presence of pus in the left pleural cavity, and bacteriological examination disclosed the presence of bacilli corresponding to those of enteric fever.

The puncture was repeated later on in the same situation, and the pus contained bacilli like those found in the fluid first removed, but much less virulent. Immunity to inoculation with virulent organisms was conferred upon animals treated with pus obtained at the second puncture. Funck, of Brussels, ⁸⁶⁸ _{May 20} reports two cases of enteric fever complicated by peripheral neuritis. The one occurred in a man 19 years old, pain in the thigh appearing suddenly, during convalescence, on the twelfth day after defervescence had occurred, following an attack of moderate intensity lasting about four weeks. Subsequently, loss of power appeared, with wasting and reactions of degeneration. Perfect recovery ensued after the lapse of a number of weeks. The second case occurred in a woman 41 years old, pain in the right lower extremity appearing at the height of a relapse, on about the thirtieth day of the illness, and being shortly followed by palsy.

Schamberg, of Philadelphia, ¹¹² _{Dec. 92} saw a case of enteric fever in a man 32 years old, in which for a week the temperature ranged in the neighborhood of 104° F. (40° C.), subsequently falling. Irritability and restlessness were marked from the outset. On the ninth day delirium manifested itself. On the ninth and tenth days vomiting took place, and on the twelfth day hiccup for twenty minutes, continuing intermittently most of the thirteenth day and, in association with attacks of vomiting, for the next five days, and without vomiting on the nineteenth day. On inquiry, it was learned that the patient had previously frequently had attacks of hiccup. He was dismissed on the forty-second day of his illness. Hawkins, of London, ² _{Dec. 17, 92} has collected from various sources sixteen cases of hemiplegia in the course of enteric fever. The patients varied from 2 to 30 years of age, the majority being males. The earliest period at which the complication occurred was during the second week, but in most instances it occurred during the third or fourth week, and during convalescence. In one case it did not occur until the eighth month. Most cases terminated in complete recovery; in a few the paralysis remained permanently, and in some cases death ensued. The right side was much the more frequently affected. Aphasia was generally present. The condition was believed to be a consequence of a non-valvular lesion of the heart, leading to the formation of thrombi in the left auricle, whence emboli were detached, carried to and lodged in a cerebral artery.

Sallès²¹¹ observed what he considered to be obliterative arteritis in a boy of 11 years, developing abruptly on the eighteenth day of an attack of enteric fever, in which there were no other complications. Le Gendre¹¹ reported the case of a man of 20, in which, on the forty-second day of an attack of enteric fever, and several days after the occurrence of deservescence, the temperature again rose without apparent cause. Shortly afterward a scarlatiniform eruption appeared, at first upon the face, then upon the extremities and abdomen, invading successively the back, the genitalia, the buccal and pharyngeal mucous membranes. The erythema was soon followed by extensive desquamation in large sheets, and the two processes continued until the death of the patient, on the one hundred and second day of the attack and sixty days after the first appearance of the exanthem. At this time the nails were almost ready to fall off; the brows had fallen out, and a good deal of the hair of the head had been lost. Throughout this secondary condition the temperature had continued irregularly elevated. The highest temperature coincided with the appearance of pulmonary symptoms: cough, dyspnoea, and the expectoration of sputum containing tubercle bacilli. No evidence of pulmonary disease had previously been detected, but now there were signs of a cavity in the lower lobe of the right lung. At the autopsy a number of tubercles in process of caseation were found, and an abscess in the lung as large as a mandarin. In the lower portion of the ileum, in the neighborhood of the ileo-caecal valve, there were numerous small, rounded ulcerations in process of cicatrization and evidences of previous ulceration. Cultures made from the scales of skin from the upper and anterior aspect of the chest developed a micro-organism indistinguishable from the *bacillus coli communis*.

Barr, of Liverpool,¹⁸⁷ describes the case of a man, 20 years old, who had a severe and protracted attack of enteric fever, complicated by hyperpyrexia, vasomotor paresis with pulmonary œdema, bilateral pneumonia, erythema, empyema, pericarditis, and an encysted accumulation of pus in the mediastinum. The treatment was vigorous and varied and recovery ensued.

From a study of insanity after enteric fever, Bauduy, of St. Louis,³⁶⁴ Feb. 15 ascribes a prominent rôle to (1) heredity, by producing an "unstable constitution of nervous equilibrium"; (2) disturb-

ances of the nerve-centres themselves, of which fever is but too often merely an expression or clinical manifestation; (3) anaemia, the direct result or anatomical substratum of the febrile process, or excessive and prolonged temperature elevation, causing "irritable weakness"; (4) toxic perturbation of nervous nutrition, superinduced by the retention of effete or excrementitious materials, resulting in qualitative blood-changes, with corresponding metabolic and somatic tissue or textural perversions; and (5) microbial invasion of special nerve-centres, preventing their normal physiological functional activity,—all of which lead to the development of a cachectic, anaemic condition of the cortical nerve-centres.

Mabit¹⁶² June 25; July 29 has recorded the case of a woman, 29 years old, married eight years, who at the age of 19 had an attack of enteric fever, keeping her in bed for two months, and followed by violent pains in the left iliac fossa, which continued for a month. After marriage the suffering increased and febrile attacks occurred. The left oviduct was found tender and much enlarged, the left ovary prolapsed and sensitive to touch. After a long course of varied treatment the tender swelling to the left of the uterus disappeared and the woman was greatly improved. Menstruation, however, failed to return.

Elliott, of Dublin,² Oct. 22, '92 relates the case of a man, 35 years old, who had a tape-worm for two years, and was seized with enteric fever. The acute illness kept the man in bed for four or five weeks, during one period of which he had a sharp attack of diarrhoea, without, however, passing any portion of the worm. On the second day after getting up he passed segments, and indications of the presence of the parasite continued for some months despite active treatment, but they finally disappeared. Reynolds, of Wolverhampton,⁶ Dec. 24, '92 has reported the case of a boy of 14, who, in what appeared to be a second relapse of enteric fever, passed a round-worm ten or eleven inches long.

Hanot³¹ Dec., '92 points out that a previously latent syphilis may be rendered active by an attack of enteric fever, and that previous infection with syphilis aggravates the prognosis. Considerable discretion is required in the treatment, which does not differ in principle from that pursued under ordinary conditions.

Relapses.—Frankenhäuser, of St. Petersburg,²¹ Sept. 2 reports the results of an analysis of 274 cases of enteric fever with reference

to relapses. There were 26 true relapses (9.5 per cent.), these, as well as pseudo-relapses, depending, according to the author, upon the development of a new generation of typhoid bacilli, although it may be possible that the spores were derived from the bacilli upon which the primary attack was dependent. The notion of re-infection is scarcely admissible, while errors in diet, excitement, and exertion have no real causative influence. The frequency of relapses varied in different years, and appeared to bear no relation to the method of treatment employed. The largest number occurred in patients between 15 and 30 years, but the percentage was larger in those over 30 years of age. The nutritive condition seemed to bear no relation to the occurrence of a relapse or to its severity. The apyretic interval between the primary attack and the relapse appeared to bear an inverse ratio to the severity of the latter. The duration varied from four to thirty-seven days. The largest proportion of relapses followed severe primary attacks.

From a study of 1559 cases of enteric fever, Podanowski⁸⁵⁹ _{See 1 to 17} comes to the conclusion that there is a typical and an atypical form of relapse, which are to be carefully differentiated. Relapses occur as a result of the action of the same poison that caused the primary disease; the view of renewed infection is not admissible; they are not common, and usually occur in the autumn and winter months. Sex and age have no influence upon their frequency. The typical form occurs generally after mild, the atypical forms after severe, attacks. The frequency is not related to the character or the intensity of the epidemic, although the mode of treatment and the surrounding conditions may have some influence. With a careful *régime* and indifferent treatment the frequency of relapses is minimized. The longer the continuance of the primary attack and of the apyrexia, the shorter the duration of the relapse.

Diagnosis.—Baruch, of New York,¹ points out the importance of the early diagnosis of enteric fever, and goes so far as to say that the successful issue of the case is almost assured if the bath treatment, according to the method of Brand, is inaugurated prior to the fifth day of the disease. In a doubtful case, as soon as the patient shows a rectal temperature of above 102.5° F. (39.2° C.) in the morning and 103° F. (39.5° C.) in the evening for three successive days, he is placed in a full bath at 90° F. (32.2° C.), which is reduced to 80° F. (26.7° C.) while friction of

the body is practiced. If after three hours the temperature is still above 102.5° F. (39.2° C.), another bath is given at 5° F. (2.9° C.) lower. This procedure is repeated until a temperature of 75° F. (23.8° C.) is reached. If one or more of these baths fail to reduce the rectal temperature 5° F. (2.9° C.) in half an hour, the diagnosis of enteric fever is almost certain, and the bath-treatment is continued. The point emphasized is that the resistance of the rectal temperature to a bath of 75° F. (23.8° C.) for fifteen minutes, with friction of the body, is an almost certain test of enteric fever.

Georgevitch, of Paris,²³ calls attention to the fact that in children the ataxic type of enteric fever sometimes closely simulates tuberculous meningitis. Under these circumstances there may be convulsions, delirium, and ocular palsy; these are, however, rare at the initial period of the attack. The differential diagnosis is always difficult and sometimes impossible. In the ataxic form in children, however, the prodromic period is relatively short, sometimes being entirely absent; the temperature is more or less pronouncedly continued and without absolute remissions; the pulse is not irregular and intermittent, and there is no parallelism, relative or absolute, between the frequency of the pulse and the elevation of temperature; the abdomen is usually tympanitic and rarely retracted; enlargement of the spleen is more constant and more decided; mental irritability is less pronounced. The ataxic form of enteric fever may manifest itself by the lateral decubitus, with the limbs drawn up; by irregular contractions of the face, opisthotonus, and cutaneous hyperesthesia. The presence of râles, scattered throughout the lungs, is in favor of a diagnosis of enteric fever.

“Transylvania”⁸¹⁴ describes as gastric fever a non-contagious febrile affection, endemic in the mountains of western North Carolina, at an altitude of 2500 feet, and in a latitude free from the extremes of summer heat and winter cold. The fever is of continued type, of abrupt onset, and characterized by the occurrence of chills, headache, nausea, and vomiting. Jaundice is, as a rule, present and epigastric tenderness almost always. The tongue is usually coated, except at its edges, which are red. Constipation is the rule. The temperature declines as suddenly as it rises. There is sometimes a tendency to delirium. The average duration

of the disease is about nine days. One of the most notable features is the sudden and great loss of flesh that occurs. The prognosis is favorable.

Management.—In a study of the influence of increased nourishment upon children suffering from enteric fever, Kissel ⁵⁸⁶_{Feb. 16, 1891; Dec. 10, '92} found that, even if the amount of nutrition be decidedly increased, a certain degree of inanition results, as manifested by loss of body-weight. The body-temperature is, however, thereby not elevated. In many cases there was no derangement of digestion; a tendency to constipation predominated. The number of complications was not increased, nor was the febrile stage prolonged. The subjective condition was not made worse. Relapses were not observed. At first there was a disinclination to take the excess of food, but subsequently there was a ready acquiescence. It could not be determined whether or not recovery took place earlier, as control observations were not made. In many cases the duration of the disease had no influence upon the daily loss of weight.

Püritz ²¹_{Feb. 11} (see ANNUAL, 1893, II-53) has found that enteric-fever patients are able to assimilate considerable amounts of albumen, both during the febrile period and in the first days of the afebrile period. The assimilation is slightly less in case of forced feeding during the febrile stage than in case of insufficient nutrition, the period of the disease, however, exercising no influence upon the amount of assimilation. In case of forced feeding with highly albuminous food, an increased amount of nitrogen is excreted in the urine. The amount of nitrogenous metabolism diminishes, notwithstanding its increased intensity. The daily loss of nitrogen and of body-weight is diminished during the febrile stage. In case of forced feeding, with a corresponding supply of water, the quantity of urine is increased, although albumen is not caused to appear in the urine. Forced feeding causes no elevation of temperature or gastrointestinal derangement. The stools become fewer and a tendency to constipation is developed. In no cases were complications or a prolongation of the disease noted. The well-being of the patient and his organic functions were improved; while convalescence was more speedy and more substantial than under ordinary circumstances.

Treatment.—Sihler, of Cleveland, ⁶¹_{July 22} makes a warm plea for the employment of the Brand bath in private practice. He has

used the method for three and one-half years, during which time he has thus treated more than ninety-five cases, principally among artisans and laborers, with over five thousand baths, in no instance with a mishap or a dangerous symptom dependent upon the bath. Thompson, of New York, ^{July 15} 961 is also an advocate of this method. (See vol. v, Sec. E.) Cantalamessa ^{505 Mar. 7; 1069 May} reports the results of the treatment of one hundred and twenty cases of enteric fever by means of prolonged baths, the patient being supported in the bath upon a sort of hammock. The duration of the bath was ordinarily from five to eight hours, although in one case it was eighteen hours. The temperature at the beginning was 87° F. (30.6° C.), but it was gradually reduced by the addition of ice to 75° F. (23.9° C.). The first effect of the baths was a notable improvement in the respiration and circulation; the secretion of urine was usually increased, but occasionally, owing to the reduced thirst and the consequent diminished consumption of fluids, it was lessened in amount; the quantity of urea was diminished about half. Among the whole number of cases there were five deaths, two from perforation almost immediately after coming under observation. It is suggested that relapses, which are more common in cases that have been treated by means of baths, may be due to the fact that there are fewer deaths.

Finding it difficult to carry out the cold-bath treatment of enteric fever, and observing that the temperature of patients thus treated rose again in a short time after being put to bed, Samuel Fenwick, of London, ^{1077 Feb. 15} came to the conclusion that the early recurrence of the pyrexia was, to some extent, the result of warmth produced by the bed-clothes. To obviate this difficulty, he devised what he calls an ice-cradle. This consists of an ordinary iron cradle, sufficiently long to cover the patient in his entire length, and broad enough not to limit his movements and thus prove irksome. Under this the patient lies, covered by some light and opaque muslin. Attached to the cross-bars of the cradle are small zinc buckets, in which ice can be placed. The outer surface of the buckets should be covered with lint, to prevent any of the condensed moisture from falling on the patient. The cradle is covered with a counterpane, except at the two ends, which are left open to allow of a constant interchange of air. A hot bottle should be placed at the patient's feet, and before the cradle is used

he should be well sponged with tepid water. It is maintained that by this means the temperature can be reduced as efficiently as by means of the bath. Its advantages are the extreme ease with which it can be employed, the absence of discomfort from moving the patient, and, with proper restrictions, the length of time it can be used, thus permanently keeping the temperature down. Ice is not necessary in all cases, the continual surrounding of the body by the air at its ordinary temperature being often sufficient. Hammerschlag⁶⁹,_{No. 30; Aug. 12} has reported five cases treated by the transfusion of blood from convalescent cases, with results that are considered indefinite. In one case a remarkable decline of temperature took place the night following the injection, but on the following evening the temperature had resumed its previous level. One of the cases terminated fatally. In three cases the blood was taken from patients only recently free from fever; in the other two they had been apyretic for from five to seven weeks. Hughes and Carter have treated several cases, at the Philadelphia Hospital, with blood-serum obtained from convalescent cases, but, although in some instances a decided impression was made upon the temperature, it cannot be said that curative results were obtained in any case.

Spence, of New York,⁵⁹,_{Nov. 26, 1892} reports the results of analysis of 323 cases of enteric fever treated in St. Francis Hospital, from October 1, 1884, to January 1, 1892, upon the expectant plan, with a mortality of 47 deaths—14.23 per cent. Of these 47 cases, 12 were moribund or so weak on admission that they died within forty-eight hours. Deducting these 12 cases, the mortality would be reduced to 11.25 per cent. In the way of treatment a dose of 5 or 10 grains (0.32 to 0.65 gramme) of calomel was administered at once, if the disease was not too far advanced; whisky was given when stimulation seemed necessary; the cold pack was used when the pyrexia was high and continued,—*i.e.*, over 105° F. (40.6°C.); when possible a water-bed was used in cases of pyrexia, but only occasionally was antifebrin or phenacetin given, and then only in single doses; troublesome diarrhoea was treated with bismuth combined with small doses of opium, or, if obstinate, 5-grain (0.32 gramme) doses of naphthalin were given every two hours until relief was afforded; in case of intestinal haemorrhage, tincture of opium was administered in doses of 5 or 10 drops, at short intervals, until the desired effect was secured. The diet was

wholly a liquid one, consisting, for the most part, of milk, together with strained meat-broths, and was thus continued until the temperature had been normal for a week. Even then great care was taken, and a full diet was only gradually reached. The patient was not permitted to rise or leave his bed under any circumstances. The cases came mostly from the lower walks of life, including the hard-worked and poorly nourished, exposed to unfavorable hygienic conditions, and, as a rule, entering the hospital as a last resort. Of the 47 fatal cases, death took place in 22 (6.8 per cent.) as a result of the intoxication and exhaustion due to the disease; in 11 as the result of the intestinal lesions; in 4 from pneumonia; in 1 from pharyngeal diphtheria; in 1 during a relapse; the remaining 8 were moribund on admission.

Tortchinsky⁸⁵⁹ No. 48, 192 has employed boric acid in the treatment of 240 cases of enteric fever in the course of an epidemic, with excellent results, only 9 terminating fatally, and these during the period of convalescence, from arising too early or from indiscretions in diet. In the remaining 231 cases, convalescence was speedy and complete. In all cases from 2 to 4 drachms (8 to 16 grammes) of castor-oil, with from 5 to 10 drops of essence of turpentine, were given at the outset. After this had acted, the administration of boric acid was begun, from 75 centigrammes ($11\frac{5}{8}$ grains) to 1 gramme ($15\frac{1}{2}$ grains) for an adult and from 18 to 75 centigrammes (3 to $11\frac{5}{8}$ grains) for a child being given three or four times a day. In case of a complicating bronchitis, expectorants and hydrochloric acid were combined with the boric acid. As a rule, fever and diarrhoea subsided at the end of from three to five days; the tympanites disappeared; the stools lost their offensive odor and assumed a natural appearance; the urine became abundant and normal in constitution; the tongue and skin became moist, and the subjective condition was improved. As soon as marked amelioration had taken place, the acid was discontinued and tonics were substituted. Under this course of treatment the disease pursued a favorable course and complications were rare. The best results were obtained in cases that came under observation early. It was found that the good effects of boric acid were augmented by the conjoint administration of small doses (from 8 milligrammes to 3 centigrammes— $\frac{1}{8}$ to $\frac{1}{2}$ grain) of antifebrin, quinine, naphthalin, or salol. The combination with quinine was especially useful in the

last stages of the disease, marked by ataxia, delirium, and other cerebral manifestations; it was also useful in cases of relapse. In no case were bad results observed to follow the treatment.

Posajnyi⁸⁵⁹ has employed salol in the treatment of 49 cases of enteric fever, in patients ranging from 11 to 32 years of age, severe diarrhoea, meteorism, or indicanuria being present. About 50 per cent. were complicated by bronchitis, catarrhal pneumonia, otitis, nephritis, and other conditions. The daily dose of the drug varied from 0.35 to 1.5 grammes (5 to 24 grains), given in three equal parts, for from one to eighteen days. Of the 49 patients 3 died (from complications: croupous pneumonia, catarrhal pneumonia, and pachymeningitis); relapse occurred in 1; intestinal haemorrhage in 2. In about 25 per cent. of the cases the salol appeared to have no favorable effect upon the patient's condition; but in the remaining 75 per cent. the intestinal fermentative processes appeared to be markedly inhibited. In the latter the stools quickly lost their specific features, while the abdominal distension and tenderness subsided, the appetite improved, and the proportion of indican in the urine gradually decreased. In about 25 per cent. of the cases the diarrhoea and other symptoms ceased after one or two days of treatment, and did not recur after the withdrawal of the drug. Not infrequently constipation occurred, necessitating the employment of enemata. No antipyretic effects were observed, nor any unfavorable influence on the heart or kidneys.

Having determined by experiments upon lower animals that pure carbolic acid may be administered internally with safety, and that it inhibited the activity of the typhoid bacillus, Charteris, of Glasgow,² had made keratin-coated pills, each containing $2\frac{1}{2}$ grains (0.16 gramme), and so prepared as to be insoluble in the gastric juice, but readily soluble in the pancreatic juice, and with which a number of cases of enteric fever were treated, with satisfactory results, the diarrhoea being moderated and the factor of the stools being overcome.

Wible, of Munhall, Pa.,¹⁶¹ has reported 48 cases of enteric fever treated with thymic acid, or thymol, with but 3 deaths. Five grains (0.39 gramme) of the drug were administered every three hours. In addition, when there were more than three or four stools during the twenty-four hours, 10 grains (0.65 gramme) of

bismuth salicylate were administered every three hours. Of the 3 cases that terminated fatally, 1 was moribund when it came under observation and died within twenty-four hours. The second came under observation in the fourth week of his illness, having had no previous intelligent care. In the third case death took place five days after the patient came under observation.

Hölscher²⁹⁷ relates his experience with guaiacol carbonate, given in doses of 15 grains (1 grammie), night and morning. The tongue became moist; the appetite returned; the stools, which smelled strongly of guaiacol, gradually assumed a firmer consistency. In some instances constipation developed, but this usually disappeared spontaneously. A favorable influence seemed to be exerted upon the bronchitis, with relief of the dyspnoea and facility of expectoration. Guaiacol carbonate is a disinfectant and not an antipyretic, and when administered alone exercised no influence upon the temperature, but when combined with acetanilid a marked and permanent influence upon the temperature was observed. In the cases thus treated ataxic and adynamic phenomena were uncommon, as well as hallucinations and other cerebral manifestations.

Barkley, of Caseyville, Ky.,⁷⁰⁰ recommends the following formula:—

R Acetanilid,	.	.	.	.	.	gr. xxiv (1.5 grammes).
Sodii salicylatis,	.	.	.	.	3ss.	(2.0 grammes).
Ammonii salicylatis,	.	.	.	.	3j	(4.0 grammes).

M. et fiat chartula no. xij.

Sig.: Take a powder every three hours in an ounce (31 grammes) of hot water, with from 6 to 10 drops of spirit of cinnamon.

If the bowels are constipated, an officinal compound effervescent powder or a dose of castor-oil and glycerin (of each a tablespoonful) is recommended, to be repeated in four hours if necessary. For several consecutive nights 20 grains (1.3 grammes) of quinine are to be given at midnight, with sufficient lemonade or toddy to dissolve it in the stomach. If diarrhoea demand treatment, the following formula will prove useful:—

R Bismuthi salicylatis,	.	.	.	.	.	3j (4.0 grammes).
Sodii bicarbonatis,						
Sodii sulphitis,	.	.	.	.	.	aa 3j (1.3 grammes).
Pulvis opii,	.	.	.	.	.	gr.v (0.32 grammie).

M. et fiat chartula vel capsulae no. x.

Sig.: Take 1 every six hours.

After having employed numerous agents in the hope of securing intestinal antiseptis, Brown, of Alexandria, Va.,⁸¹ has selected iodoform, creasote, and calcium sulphide as the most useful. A capsule containing 1 grain (0.065 grammes) each of iodoform and creasote is administered every three hours. If diarrhoea be present, a small quantity of opium is added. In cases in which haemorrhage has occurred the following combination has proved efficient:—

R Iodoform.,	ʒij (1.3 grammes).
Creasoti,	gtt. xx.
Acid. tannic.,	ʒij (2.60 grammes).
Pulv. opii,	gr.v (0.32 grammes).
Ergotin.,	ʒiss (2.0 grammes).

M. fiat capsulae no. xx.

Sig.: Take 1 every hour or every two hours, according to the amount of haemorrhage.

Every third hour a pill containing calcium sulphide, 1 grain (0.065 grammes), is given.

Loranchet³⁶³ _{Feb. 18; June}¹¹² reports the employment of mercuric chloride in twenty-one cases, with amelioration of the grave symptoms and apparent lessening of those dependent upon intoxication. The tongue remained moist and clean, and there was a noteworthy absence of tympanites. The dose employed was about $\frac{1}{64}$ grain (0.001 grammes) four times a day, in water. Recovery took place in all of the cases.

Assuming that the cell destruction that takes place in the course of an attack of enteric fever is dependent upon the action of the typhotoxin, Thistle, of Toronto,³⁹ _{Apr.} contends that the indications to be met are (1) the removal of any portion of poison already formed; (2) the prevention, as far as possible, of the generation of further poison, and (3) the limitation, as far as possible, of the action of the poison already in contact with the tissues. These conditions will best be met by the adoption of a plan of treatment that combines free elimination with antiseptis, together with the administration of generous quantities of water. In thirteen cases treated upon these lines with calomel and salol, the results were eminently satisfactory.

Roussel, of St. Etienne,²² _{May 2} has employed antipyrin, in progressively-increasing doses, in ninety-three cases of enteric fever, without the loss of a case. On the first day he gave 10 grains (0.65 grammes) four times, at intervals of three hours; on the

second day, 20 grains (1.3 grammes), morning, noon, and night; on the third day, 1 drachm (4 grammes) in four doses; thereafter, an increase of 20 grains (1.3 grammes) daily until 2 drachms (8 grammes) were taken, leaving an interval of two hours between doses. Drake, of Louisville, ¹⁰⁵_{Feb. 1}, reports the successful employment of baptisia tinctoria, 10 drops of a fluid extract every four hours until convalescence is established. Vance, of Sonoma, Cal., ¹⁹⁹_{Nov., '92}, expresses the opinion that, when in a young, plethoric subject the onset of an attack of enteric fever is marked by sharp abdominal pain, half a dozen leeches applied over the ileo-cæcal region often afford relief. Mason, of Walton-on-Thames, ⁶_{Aug. 19}, has reported a case of enteric fever, complicated by a painful swelling in the upper part of the left thigh, in a domestic 22 years old, in which an apparently hopeless condition, attended with a pulse of 172, a respiratory frequency of 84, and with lividity, was dissipated by the inhalation of about $\frac{1}{2}$ gallon of oxygen in the course of twenty minutes. A second inhalation, five and a half hours after the first, was followed by a critical discharge from the bowels, and the woman was soon on her way to convalescence. Thompson, of Woodstock, Va., ⁵⁹_{Feb. 18}, recommends the subcutaneous injection of strychnine sulphate, in doses of from $\frac{1}{120}$ to $\frac{1}{30}$ grain (0.0005 to 0.002 gramme), repeated according to circumstances, for the relief of the collapse that sometimes takes place in the course of enteric fever, and due neither to intestinal haemorrhage nor to perforation.

MOUNTAIN FEVER.

Work, of Pueblo, Col., ⁹_{Apr. 8}, expresses the opinion that so-called mountain fever is not a disease *sui generis*, but a group of symptoms dependent upon distinct pathological conditions. Imperfect forms of specific continued fevers, such as enteric and relapsing, localized inflammations partially developed, acute catarrhal inflammations of the alimentary or respiratory mucous membrane, and disturbance or exhaustion of the nervous system, will, if diligently sought for, furnish a basis of diagnosis. The majority of cases in adults can be grouped under the head of simple continued fever; next in frequency is enteric fever of modified type. In eighteen of fifty cases of mountain fever rose-spots were present, and in five fatal cases the intestinal lesions of enteric fever were found. Woodward, of Richmond, Va., ⁸¹_{Sept.} records the results of

an analysis of sixteen cases of atypical enteric fever or mountain fever, exhibiting symptoms peculiar to both enteric fever and bilious remittent fever.

TYPHUS FEVER.

Etiology.—Dubief and Bruhl, of Paris,⁶⁷³ May report the results of a bacteriological study in nine cases of typhus fever, of which six proved fatal. In all they found a micro-organism in the peripheral blood and in the spleen, for which they propose the name of "diplococcus exanthematicus." The organisms were also found in the nasal fossae, the pharynx, the larynx, and the lungs. In reporting a case of typhus fever that had escaped diagnosis, Netter¹⁴, June 25 expressed the opinion, which was concurred in by others, that the contagion of the disease is spread by prolonged and intimate contact, and not by the atmosphere. Careful observations show, further, that the average period of incubation is twelve days.

Symptomatology.—Szwojcer²⁹⁷, Jan. 4, 7, 11, 14 gives the results of an analysis of 109 cases of typhus fever, in the Reserve Hospital at Warsaw, between February 2 and August 18, 1889. The monthly distribution of the cases was as follows: February, 13; March, 9; April, 18; May, 23; June, 21; July, 22; August, 3. Most of the cases were prisoners. Eight were infected within the hospital,—1 physician, 1 Sister of Charity, 2 male and 3 female attendants, 1 porter, and 1 patient. The entire service of the hospital included 54 persons. In the larger number the disease was transmitted by immediate contagion, in others by the air. In one case the exposure to the poison was but momentary. The risk of infection appeared to be proportionate to the duration of exposure and the proximity to the source. Secondary cases were most common during the convalescent period of primary cases; so that, making allowance for the period of incubation, contagion must have taken place most commonly at the time of desquamation. Investigation showed that an inverse ratio existed between the number of cases of typhus and the number of cases of enteric fever. An attack of relapsing fever seemed to predispose to the occurrence of an attack of typhus. On the other hand, with the appearance of influenza the number of cases of typhus fever became smaller. Most of the cases could be traced to crowding, poor hygiene, and insufficient food. Among the whole number

of 109 cases but 7 were in females. The cases had the following distribution, according to age: between 14 and 20 years, 43 males; between 20 and 25, 29 males and 3 females; between 25 and 30, 14 males and 1 female; between 30 and 35, 7 males and 2 females; between 35 and 40, 2 males and 1 female; between 40 and 45, 2 males; between 45 and 50, 3 males; between 50 and 60, 2 males. In private practice, quite a number of cases were observed in children, one in an infant a year old, terminating fatally. As a rule, one attack appeared to confer immunity to subsequent attack. According to occupation, the largest number of cases occurred in laborers; then successively in shoemakers, locksmiths, drivers, tailors, correspondents, tradesmen, painters. Bacteriological investigation failed to yield positive results. In 4 cases in which it was possible to determine the period of incubation, this was three, four, nine, and eleven days, respectively. In the majority of cases the advent of the prodromal symptoms was gradual, and attended with repeated chills, rarely with a single, severe rigor, the temperature, meanwhile, fluctuating between 38.8° and 40.2° C. (102° and 104.4° F.). In 2 cases in which pilocarpine was tentatively administered, the temperature fell within thirty-six hours, the subjective condition at the same time improving. Subsequently, however, the condition was aggravated. For the first few days of the attack the temperature fluctuated between 38° and 39.8° C. (100.4 and 103.5° F.), rising gradually until the fourth or fifth day,—that preceding the appearance of the eruption,—when it fell slightly, reaching its maximum between the sixth and the ninth day, thereafter declining by marked remissions, the fever terminating by crisis, lysis, or pseudo-crisis. The variations between the morning and the evening temperature were considerable. The hourly variations, however, were slight. In most cases the fever was of a continued type.

The duration of the attack, exclusive of complications, varied from four to twenty-one days. Defervescence took place oftenest on the fourteenth or sixteenth day, and usually by crisis. As a rule, the frequency of the pulse corresponded with the elevation of temperature, though throughout the attack there seemed to be a tendency to acceleration of the pulse. For some days after defervescence had occurred there seemed to be a tendency to undue slowness of pulse, particularly in cases marked by crisis. Next to

the fever the exanthem was the most constant symptom observed, being absent in only two doubtful cases. Its first appearance was usually noted between the third and the fifth day, reaching its greatest intensity in the course of two or three days more and disappearing slowly at the close of the second week. As a rule, it appeared first upon the chest and abdomen, then successively upon the back, the extremities, the face, the hands and the feet, disappearing in the reverse order. It usually assumed the form of maculæ, sometimes of papules, and at other times of petechiaæ. No relation was observed between the intensity of the eruption and the fatality of the cases. Sudamina appeared rather frequently at the time of and after the crisis, and seemed to be of favorable prognostic indication. Disturbances of the nervous system were among the most constant manifestations. Headache was the earliest of these and was usually frontal or temporal. Pains in the legs and in the back were present in almost all cases at the onset, increasing in intensity with the progress of the attack. In some cases there was general hyperæsthesia. In cases characterized by hyperpyrexia cerebral symptoms, such as loss of consciousness, delirium, apathy, somnolence, appeared early. In the worst cases sopor and coma appeared toward the close of the second week, with carphology, subsultus tendinum, delirium, and prostration; in others hallucinations and illusions, insomnia, incontinence of urine and faeces, singultus, hyperæsthesia, and Cheyne-Stokes breathing were observed. Simultaneously with the eruption catarrhal manifestations appeared in eyes, nose, and ears. Epistaxis was rather frequent. Bronchitis was observed in most cases. Pneumonia developed in a number. Digestive derangement was not marked. A few cases presented diarrhœa. The spleen was usually palpable on the third day, gradually increasing in size until the middle of the second week. In a small number of cases the liver was enlarged, one case being attended with icterus. The urine was examined in all cases, albuminuria being found in a considerable number, and most marked in the worst cases. Hyaline and epithelial tubercles were also occasionally found. In uncomplicated cases convalescence set in, as a rule, with the crisis. The complications were principally of an inflammatory nature, with a tendency to suppuration. In addition to pneumonia and pleurisy, there were observed enlargement of lymph-glands, phlegmonous processes,

parotiditis, bed-sores, gangrene, and cerebral haemorrhage. Among the whole number of cases there were 10 deaths,—a mortality of 9 per cent.,—distributed as follows: between 14 and 20 years, 1; between 20 and 30, 3; between 30 and 40, 3; between 40 and 60, 3. In all of these, complications of varying severity were present. The most-marked anatomical lesions were swelling of the solitary and mesenteric glands and numerous ecchymoses in the stomach, the kidneys, and the brain. The intensity of the round-celled infiltration in various parts appeared to be the only specific characteristic. The treatment was essentially expectant, symptomatic, and hygienic-dietetic.

Lancereaux¹⁴,_{May} gives the results of observations upon ten cases of typhus fever. Of this number two died, the autopsy revealing only congestion at the base of the lungs; heart, liver, pancreas, kidneys, brain, and digestive tract presented no abnormality; the spleen was enlarged in the one, but unchanged in size in the other. Cultures from this organ gave negative results. All of the cases were characterized by turgescence of the face and conjunctiva and by lachrymation. The eruption occupied the trunk and the extremities, exceptionally the face; it was most marked upon the abdomen and in the groins. It appeared in the form of papules, varying in size from a pin-point to the papule of rubeola, and occasioned a marbled appearance. Some of the papules appeared dull and wine-colored; others were bright and of a rose-color, but none disappeared upon pressure. The eruption generally disappeared at the end of eight or ten days. The temperature of the patients varied from 40.6° C. (105° F.) and 38.8° C. (101.8° F.); the difference between night and morning was quite considerable. The pulse was feeble, frequent, rarely dicrotic, beating between 96 and 130. Respiration was accelerated and laborious, the voice was rough and faint, and signs of bronchitis were present. The tongue was coated and dry and sometimes fissured. The abdomen was relaxed and not painful. There was no vomiting, but there was diarrhoea, the stools being greenish in color and containing mucus. The urine was acid, scanty, turbid, and pale, and upon standing deposited mucus and urates. The proportion of urea present was diminished, varying from 11 to 20 grammes (2½ to 5 drachms). The proportion of phosphoric acid varied from 1.50 to 2.60 grammes (24 to 40½ grains); that of chlorides from 4 to 8 grammes

(1 to 2 drachms). The urine contained from 0.20 to 0.45 grammes (3 to 7 grains) of albumen in twenty-four hours. The blood, examined spectroscopically, presented no abnormality. The symptoms referable to the nervous system were profound. There were great depression of the vital forces, extreme prostration, muscular tremor, delirium or coma, insomnia, rectal and vesical incontinence, fixed eyes, contracted pupils, articular pains, and cutaneous hyperæsthesia. There were, additionally, impairment of hearing and epistaxis. Deservescence occurred on about the fifteenth day and was followed by convalescence.

De Brun, of Beyrouth, ¹⁴ Aug. 30, describes the nervous manifestations observed in an epidemic of typhus fever. The most noteworthy were headache, vertigo, insomnia, rachialgia, gastralgia, cutaneous hyperæsthesia, general soreness, prostration, tremor, subsultus tendinum, impairment of intellect, loss of memory, delirium, and various psychic manifestations. Combemale ³¹ July 15, reports four cases of grave type in which on the fourteenth, twelfth, thirteenth, and eleventh days, respectively, there appeared upon the alæ nasi, the pavilion of the ear or the forehead, in the nature of a critical manifestation, a number of whitish, pulverulent efflorescences, which, upon being rubbed with the finger, re-appeared in a few hours, and which, upon examination, were found to be constituted of degenerated epithelial cells and fatty matter. Two of the cases terminated fatally, one on the day of the appearance of the eruption, the other a day later. In the other two recovery ensued, the appearance of the efflorescences being shortly followed by deservescence. In the fatal cases the significant lesion found after death was acute nephritis. Combemale ³⁶³ July 29, has also reported two cases in which temperatures of 33.8° C. (92.8° F.) and 33.2° C. (92° F.), respectively, were observed. The diagnosis was indubitable. Two alternatives were offered in explanation: (1) that the low temperature was the expression of a depressant action upon the thermogenic centres of the poisons generated in the course of the disease, and (2) that it was a manifestation of uræmia dependent upon parenchymatous degeneration of the kidneys. One of the cases terminated fatally, and post-mortem examination disclosed the existence of parenchymatous renal changes.

Diagnosis.—According to Netter, ¹⁴ Apr. 23, the following points should be considered in the diagnosis of typhus fever: 1. The

time of the epidemic; typhus is a disease of winter and spring. 2. The age of the patient; the average age is more advanced than in the case of enteric fever. 3. The social condition; excluding those in attendance upon the sick, typhus attacks almost exclusively those without domicile. 4. The frequency of contagion, which is exceedingly rare in cases of enteric fever. 5. Inquiry concerning physicians, nurses, and assistants; these usually furnish a full quota of victims. 6. The previous occurrence of enteric fever; recurrence of enteric fever is uncommon. 7. Typhus is characterized by the shortness of the interval that elapses between the time when the case comes under observation and the occurrence of death or the setting in of convalescence; death or recovery takes place later in case of enteric fever. 8. The high mortality is an element in the diagnosis.

Treatment.—Combemale and Gaudier¹⁴ give the results of the employment of the cold bath in the treatment of 18 cases of typhus fever. But two baths could be given daily, one at 9 in the morning, the other at 4 in the afternoon. The temperature of the water was 18° C. (64.4° F.), sometimes being lowered to 15° C. (59° F.), the patient being introduced if his axillary temperature exceeded 39° C. (102° F.). The maximum duration of the bath was ten minutes. The immediate result of the immersion was a sense of discomfort; while at first there may have been a tendency to rebel, a number of the patients subsequently became quite eager for the baths. After reaction had set in there was a feeling of well-being, the headache diminished, the musculo-cutaneous excitability moderated, the tongue became moist, and cough and expectoration were facilitated. In the 18 cases considered, three hundred baths were given without a single accident. In cases of moderate intensity defervescence set in on the seventh day; in grave cases, on the fifteenth day. Eight of the cases terminated fatally,—44 per cent.; but, of these, only 3 had been bathed before the seventh day; in the others the baths were begun on the eighth, ninth, eleventh, and thirteenth days, respectively. Four died before the end of the first week; the others on the seventeenth, eighteenth, twenty-first, and twenty-second days, respectively; some of myocarditis, others of acute bed-sores. From these observations it is concluded that cold baths favorably influence the course of typhus fever, lowering the temperature and

relieving the typhoid condition and the nervous symptoms. The baths should not, however, constitute the only therapeutic measure; tonics, alcohol, and quinine should also be generously administered. In case of cardiac asthenia injections of caffeine should be practiced. Alimentary diuretics, such as milk, also play a prominent part in the treatment of typhus.

Scheschminzew⁵⁷¹_{Nov. 5, 19; May 20} has had good results from the internal administration of creolin in doses of $\frac{1}{4}$ grain (0.045 gramme) in distilled water from four to six times daily. Cases thus treated pursued a milder course, while the fever was less intense and more submissive.

Vance, of Sonoma, Cal.,¹⁹⁹_{Nov. 7, 92} recommends the application of leeches upon the temples or upon the ears during the fierce delirium or intense cephalalgia in cases of typhus fever in the young and robust.

MALARIA.

Etiology.—Marchiafava and Bignami⁶⁹_{Dec. 22, 92} conclude that malaria is an infectious disease caused by a haematozoön that does not belong to the order of schizomycetes, but to the protozoa (Laveran). The haematozoa appear as amoebæ, which develop within and at the expense of the red corpuscles, converting the haemoglobin into melanin or rapidly causing a toxic necrosis, anaemia thus resulting. The amoebæ complete within the red corpuscles a cycle of existence beginning with the motile unpigmented forms (which become pigmented in the process of development), and terminating with the segmentation forms, representing the multiplication of the organisms. As soon as the spores resulting from the segmentation are set free, they are replaced by new amoebæ, which, in their turn, invade other red corpuscles. This cycle of life is repeated regularly in harmony with the periodic recurrence of the paroxysms, segmentation being coincident with the beginning of a paroxysm (Golgi). During this cycle of existence the amoebæ probably give rise to the formation of toxic substances, the actual demonstration of the existence of which is, however, yet wanting. In the act of reproduction the amoebæ probably produce a pyrogenic toxin; during their intra-corporeal development, in the course of fevers of severe grade, they produce toxic substances possessing the property of causing necro-

sis of the red corpuscles, of separating the haemoglobin from the protoplasm, and of inducing changes in internal organs,—*e.g.*, the kidneys in some pernicious forms. The morphological and biological peculiarities of the parasites differ among the various type or species of fever; so that the existence of several varieties of parasites seems reasonable. The difference in the pathogenic peculiarities of the parasites justifies the assumption of various types or species of fever. The most recent investigations lead to the acceptance of the following varieties: The amoeba of quartan fever (Golgi); the amoeba of tertian fever (Golgi); the amoeba of summer-autumn tertian fever; and the amoeba of quotidian fever. The pernicious types of fever are caused only by the last two, and the character of the attack is explicable by the biology of the parasites. The practical outcome of this knowledge is that it thus becomes possible to differentiate at once those cases that may prove pernicious from those that never do. The amoebæ of malaria, which develop and multiply in the blood, occasion not only acute changes, alterations in the blood, leading to hypoglobulina, but also in the vascular system of all, and of the parenchyma of some, of the viscera (spleen, liver, medulla of bone). These anatomico-pathological changes are but transitory in some organs, and largely explain the symptoms dependent upon the acute infection. In other organs (spleen, liver, medulla of bone), however, the changes are of a more permanent character, and suffice to explain the chronic anaemia, as well as the symptoms of chronic infection and the cachexia.

Mannaberg, of Vienna,<sup>2023
v.11,p.437,92</sup> divides the micro-organisms of malaria into two groups: (1) parasites that undergo direct sporulation without syzygies, and (2) parasites that undergo direct sporulation with syzygies. In the first group are placed the organisms connected with the quartan and tertian varieties of the disease; in the second the pigmented and unpigmented organisms found in the blood of patients suffering from quotidian ague, and also those described as occurring in the malignant forms of tertian ague. It was demonstrated that the younger forms of all of the organisms are not found within the blood-corpuscles, but outside. The semilunar bodies are believed to be formed by the coalition of from two to four amoeboid bodies. The effect of the administration of quinine is to destroy and render the organisms inert,

Bacchelli, of Rome, ³⁴ Nov. 29, 1922 succeeded in two cases in transmitting malaria by means of the blood of malarial patients, tertian fever developing in the person inoculated with the blood from the patient with tertian fever, and quartan in the person inoculated with the blood of the patient with quartan fever.

Allen J. Smith, of Galveston, Texas, ⁴⁵¹ Jan. records a case of malarial fever in which, during the first few days of observation, the crescentic forms of the haematozoön and the large spherical and ovoid forms appeared in regular alternation.

Bartley, of Brooklyn, ¹⁵⁷ Jan. has succeeded in demonstrating the presence of malarial organisms in the water obtained from the source of common supply for the city of Brooklyn.

Histology.—In an histological study of the viscera in a fatal case of pernicious malarial fever, Stieda ⁸⁵⁴ v. 4, Nov. 9, 1910 found the trabecula of the liver stained brown, with accumulations of round-cells between the acini. The vessels were distended with blood, the large number of leucocytes present being a striking feature. The hepatic cells contained a good deal of shining, brownish pigment, but were in nowise degenerated. The same kind of pigment was present in smaller amount in the connective tissue of the liver and in the vessels. All of the granules yielded the iron reaction to potassium ferrocyanide and hydrochloric acid. The capillaries and larger vessels contained free, blackish granules that did not yield the iron reaction. In the splenic pulp an increase in the number of colorless blood-cells was found. A good deal of pigment yielding the iron reaction was present, partly free and partly contained in the leucocytes. The vessels were distended with blood and contained many leucocytes and considerable pigment; a second pigment was found that did not respond to the tests for iron. The parenchymatous structure of the pancreas was normal. Isolated areas of interstitial inflammation were visible. In the vessels were a small number of granules containing iron. The cortical structure of the kidney presented isolated interstitial accumulations of round-cells. The epithelium of the convoluted tubules was necrotic in places. These tubules, as well as the epithelium and the vessels, contained finely-granular pigment, yielding the haemosiderin reaction. The straight tubules and the glomeruli did not yield this reaction. The vessels and glomeruli contained blackish-brown granules in small number that did not

respond to tests for iron. The capsules of the glomeruli became stained a deep blue on treatment with potassium ferrocyanide and hydrochloric acid.

Symptomatology.—Négel²²³ v.t.Nos.1,2 reports a peculiar type of remittent malarial fever observed in Roumania, for which he proposes the designation "pseudo-continuous." The attack sets in with headache, vertigo, vague general pains, and pain in the loins. Perhaps an attack of intermittent fever has preceded the onset. The temperature is elevated from the beginning, and on the second day may reach 39.5° or 40° C. (103° or 104° F.), with remissions of from 0.5° to 0.8° C. (0.9° to 1.44° F.). The appetite is lost, and there may be constipation or diarrhoea. Vomiting occurs, while there is little abdominal distension and only exceptionally pain in the right iliac fossa. The spleen is enlarged and painful on pressure, and the liver is also increased in size. The tongue is coated, sometimes with a yellowish-black fur. It soon becomes dry and red at the margins and tip; in rare cases it becomes dry and hard and the gums covered with sordes. The physical signs of acute bronchitis are present, while pneumonia is exceptional. Sometimes there is epistaxis in the first two or three days. In isolated cases rose-spots are present. In cases that begin as intermittent fever there is sometimes profuse sweating and sometimes sudamina. There is early delirium and agitation, aggravated toward night. The facies is that of the typhoid condition. The pulse is strong and full, without dicrotism. On the seventh or eighth day of the disease convulsions may take place, or there may be tremor of the tongue and of the upper extremities and subsultus tendinum. The attack ordinarily comes to an end between the seventh and the fifteenth day. Convalescence is often accompanied by pyrexia of intermittent character, which disappears either spontaneously or on the withdrawal of quinine, or even by change of diet. In cases that recover, strength is rapidly regained; in those that terminate fatally, the adynamia increases, the delirium persists, the tongue becomes dry and fissured, the abdomen distended, the bronchitis generalized, the pulse frequent, the remissions less pronounced; death may be preceded by coma, attended with profuse perspiration. Post-mortem the lesions of chronic malarial poisoning are found. The prognosis is ordinarily favorable. The treatment is that common to grave forms of malarial fever. Scott, of

Shire Highlands, British Central Africa,³⁶ describes a malignant type of malarial fever encountered in Central Africa, to which the name of "black" fever is popularly given. It generally occurs in those who have been in the country for a considerable length of time or have been more or less exposed to malarial influences, or in those whose constitution has been undermined by exposure, excessive work of a pioneer kind, or excesses of other kinds. It would appear that there is no such thing as acclimatization to African fever; on the contrary, the longer one has been in the country, the more liable he is to a severe attack. The most conspicuous symptoms of malignant African fever, in addition to the classic manifestations of malarial disease, are: haemoglobinuria and albuminuria, with suppression of urine and uræmia; icterus, nausea, vomiting, and hiccough. Death is the common issue, though the disease is not always fatal, recovery taking place in perhaps 40 per cent. of cases. Treatment is most unsatisfactory, neither quinine nor arsenic proving of much avail. The most important therapeutic measure is the administration of quinine as a prophylactic. In some cases surgical complications appear, such as the formation of multiple, painful, superficial, smallish ulcers upon the hands, fingers, or legs, in consequence of a mosquito-bite or other equally unimportant traumatism. Guyot¹⁴, July 2, has reported a case, presenting incoercible vomiting, which refused to yield to all ordinary measures, but which ceased almost instantaneously after an injection of quinine. The patient had lived at Panama, and, beyond the vomiting, presented no manifestation of malaria, though his spleen was slightly enlarged.

Miner, of Combination, Mont.,⁵⁹ April 22, has reported a case of typical quotidian malarial intermittent fever observed at an elevation of more than 6000 feet above the level of the sea, and which responded to treatment with quinine. Dubujadoux²¹³, Nov. 22, points out that peptonuria is a constant manifestation of malarial intermittent fever, as it is of other febrile conditions, appearing with the onset of the paroxysm and often increasing to the end of the attack. He found 95-per-cent. alcohol the best reagent for determining the presence of peptone, first removing the albumen. Ascoli, of Rome,³¹, Nov. 29, 1902, has found the amount of peptone in the urine greater after a malarial paroxysm than during its occurrence, the excess persisting in progressively diminishing degree for twenty-four hours.

after the attack. Quinine augmented the excretion of peptone. The peptonuria was not proportional to the intensity of the fever, but to the severity of the attack, and was particularly pronounced in cases presenting the type of summer infection. The condition is ascribed to the disintegration of the blood-corpuscles during the paroxysm.

Pensuti, of Rome, ³¹ has found that in all varieties of malaria the toxicity of the urine was increased from the beginning to the end of the attack, but not with any regularity of progression. The more toxic the urine, the more abundant the phosphates present and the deeper the color. The excretion of potassium rose and fell with the toxicity, though not constantly; so that the latter is not to be ascribed to the presence of potassium.

Rempicci, of Rome, ³⁴ has observed that the amount of sodium in the urine increases after mild attacks of malaria, while the amount of potassium increases after the graver attacks; although the elimination of potassium and sodium appears to bear no relation to the febrile paroxysms. The amount of potassium is more nearly proportional to the amount of urine than is the amount of sodium.

Complications and Sequelæ.—Alföldi ⁶²² has reported an epidemic of malarial fever, in the course of which he saw 46 cases. Of this number 5 were complicated by endocarditis. Of these 5 cases, 2 were of quartan type and 1 of tertian type; 2 came under observation in the second paroxysm; the others had had several attacks, though none more than five. The diagnosis was based upon an increase in the area of cardiac percussion dullness, upon a systolic murmur at the apex, and upon the accentuation of the pulmonary second sound. The febrile symptoms disappeared upon the administration of quinine, while those referable to the heart persisted. Neither of the patients was specially anaemic, and not one of them was aware of the previous existence of a valvular lesion.

Ferreira, of Rio Janeiro, ¹¹⁸ makes the statement that the renal complications of impaludism are much more common than is ordinarily understood, and that albuminuria in particular may often be found in children. This is the case not only with febrile forms of malaria, but also with apyretic and latent forms. As a result of careful observations upon the relative frequency of the various renal complications attending impaludism, it was found that albu-

minuria was the most common, simple polyuria next in frequency, and glycosuria but exceptional. Not rarely the albuminuria is associated with œdema, thus closely simulating nephritis. In some cases nephritis actually develops in the course of time; the albuminuria fluctuating irregularly in degree in the apyretic cases, increasing with the exacerbations, and subsiding with the remissions in the febrile cases. The symptoms can be made to disappear by energetic treatment with quinine, preceded by a mercurial.

English, of Millburn, N. J.,⁵⁹ contends that malarial poisoning may cause any morbid condition that can be induced by acute or chronic, active or passive congestion of internal organs. Browning, of Brooklyn,¹⁵⁷ has reported two cases of neuritis of malarial origin, presenting symptoms simulating those of brain-tumor.

Treatment.—In a recent work Tommasi-Crudeli²⁰⁴⁶ points out that the poison of malaria is inherent in the soil; that it depends greatly on the influence of season, temperature, and rainfall; that it is excited to fresh activity by all measures involving the disturbance of earth long left quiescent; and that its ravages have been much reduced by drainage, by the conversion of naked soil into meadow-land, and by the erection of houses and laying down of paved streets. The traditional precautionary measures long adopted in malarious countries have had two ends in view—viz., to reduce, as much as possible, the quantity of the malarial ferment that enters into the system through the air breathed, and to prevent its lengthened abode in the system. The first point is sought to be achieved by avoiding agricultural operations during those hours at which the malarious influence is most potent—viz., about sunrise and sunset. Another point of the greatest importance is to avoid breathing the air in close contact with the soil, as the malarious poison rises only a short distance in a vertical direction. This end has been attained by erecting platforms, four or five metres high, upon which the people may sleep in the open air with comparative impunity. Another mode of eluding the malaria-laden air, in close contact with the ground, is to construct the dwellings in such a way that when the door is shut the internal air is renewed only by the strata of the local atmosphere that are near the roofs of the houses. This is managed, in some localities, by having the only opening in the outer walls at the door, and all

the windows open on an inner yard at a higher level than the ground-floor of the house. It is advisable also to keep the windows closed in the morning and during the early hours of the evening, especially if any excavation should be going on in the neighborhood. Flowers should be entirely excluded from houses when malaria is rife, or the utmost vigilance should be taken to secure thorough ventilation.

Williams,⁹⁹ Mar.⁹ reports 18 cases of malarial fever (12 tertian, 5 quotidian, and 1 irregular) treated in the Boston City Hospital by the intermittent administration of quinine, the temperature and not the chill being taken as a guide. Twenty grains (1.3 grammes) of quinine sulphate were given when the temperature began to fall. On leaving the hospital the patients were given quinine, to be taken on the seventh, fifteenth, and twenty-second days. It was not necessary to give quinine on the second day, as there was rarely any chill after the first dose. The intermittent method of administering quinine lessens the risk of the cinchonism that is likely to follow the administration of continuous doses; further, convalescence sets in more rapidly and a smaller amount of quinine is required. In severe forms of malarial fever one should not wait for the intermission or remission. If the stomach be intolerant, high rectal injections may be practiced; if there be urgency, quinine may be given subcutaneously, or even by intravenous injection. Laborde and Grimaux^{3 151} Feb.; Mar. recommend the employment of a new salt of quinine—the chlorosulphate—in the treatment of malarial fevers. It is said to possess the same action as the ordinary sulphate of quinine, but has the advantage of being soluble in its own weight of water; so that it should prove valuable for hypodermatic injection. Given in this way, it occasions less pain than the sulphate or hydrochlorate. The doses employed correspond with those of the other salts of quinine.

Franeez, of Carenco, La.,⁷⁶⁰ Oct. 8, '92 agrees that in the treatment of malarial remittent fever the indication is to administer quinine, and at once, in full doses, at short intervals, until physiological effects are produced. When cinchonism is induced, the intervals should be lengthened, without, however, discontinuing the use of the drug. Various other agents may be employed in conjunction with quinine to meet special indications. Antimony, in 1-grain (0.06 gramme) doses every two or three hours, is useful when the face is

highly congested and there is violent headache. Of other adjuvants, the least dangerous and the most useful are general warm baths. Local ablutions of the entire body with water and some alcoholic render good service; or the patient may be plunged into a cold bath, to be followed by a warm bath, after which tea or coffee, together with Jamaica rum, brandy or cognac, or whisky, is to be given. The salts of opium and pieces of ice kept in the mouth are recommended to control vomiting, but a mixture of chloroform and cherry-laurel water has also proved satisfactory. Sinapisms to the epigastrium are useful. To diminish the intensity and shorten the duration of the fever, sulphur in doses of 15 grains (1 grammie) four times a day for an adult is recommended. Cases of adynamic type are better treated by means of a combination of extract of cinchona and rum, whisky, or cognac. In syncopal or comatose cases, tincture of nux vomica is added. As a prophylactic measure, the drinking-water in malarial localities should be boiled.

Villard¹⁴ has treated twenty cases of well-defined intermittent fever of diverse type (quotidian, tertian, and irregular) with cinchonidine sulphate, in doses varying from 1 to 1.5 grammes (15 to 23 grains) daily for adults. Most commonly the attack was brought to an end in the course of the first two days; in several cases, however, it was necessary to continue the treatment for three or four days. After the acute attack had been controlled one dose of a salt of cinchonidine was administered every seventh day for two or three weeks. Cinchonidine is regarded as almost as efficacious as quinine in intermittent fever; besides, it exerts a salutary influence upon the anaemia and the visceral congestions; while the physiological disturbances that sometimes follow the administration of quinine are less common and less profound. Having demonstrated (see ANNUAL for 1892) that methylene blue is capable of curing malarial fever, Guttmann, of Berlin,³⁴ Dec. 20, 1892 ascertained further that the remedy prevents recurrence, and also that it is efficacious in the pernicious forms. To prevent recurrence, the drug must be given for a period of at least four weeks. It exercises a destructive influence upon the malarial parasites, which disappear, at the latest, in the course of a week, without undergoing morphological change. When methylene blue is to be given for a long time it is recommended that in the first week 0.5 grammie (7.5 grains) be given

daily in doses of 0.1 grammie (1.5 grains) in capsule ; and thereafter 0.3 grammie (4.5 grains) daily in three equal doses for three weeks.

Kasem-Beck, of Kasan,³¹⁹ used methylene blue in 30 cases in which quinine and its salts disagreed, or in which these and other drugs, including phenacetin, antipyrin, phenocoll hydrochloride, ammonium chloride, tincture of helianthus, eucalyptus globulus, and arsenic had failed. The diagnosis was based on the physical examination, the blood being studied in but one instance, in which malarial parasites were present ; the cases were, however, in other respects typical. The patients varied in age from $2\frac{1}{2}$ to 40 years. Three suffered from masked intermittent fever, in one manifested by trigeminal neuralgia, in another by headache, and in the third by pains in the eyes for five years. It was in the last case that plasmodia were found in the blood. The remaining cases presented intermittent fever of varying kind, mostly, however, of tertian and quartan type. The duration varied from three weeks to a year, but was mostly from three to six months. The drug was given four or five times a day, at intervals of an hour, in capsules, in doses of 0.1 grammie ($1\frac{3}{4}$ grains), with 0.17 grammie (2.5 grains) of powdered nutmeg. The paroxysms soon ceased, as a rule, and in only 1 case did recurrence take place, for the dissipation of which the official solution of potassium arsenite, in ascending doses, became necessary. In 5 cases vomiting followed the ingestion of the first one or two doses. In most cases there was increased frequency of micturition, unattended, however, with pain. In some cases, in which the nutmeg was omitted, and in some in which full doses (0.30 grammie—4.5 grains) were given, strangury occurred ; haematuria appeared in 1 case, but ceased after the withdrawal of the remedy.

Porenski and Blatteis, of Cracow,¹¹⁶ employed methylene blue in thirty-five cases of intense malarial fever, and conclude that the drug exercises an influence upon the plasmodia, as these were found to disappear and the paroxysms not to recur. The remedy was administered internally, or injected subcutaneously. The injections were given twice daily, 1 grammie (15 grains) of from a 1-per-cent. to a 5-per-cent. solution of methylene blue being used on each occasion. They were unattended with local pain or infiltration. The paroxysms did not recur after from three to five injections had been given. By the mouth capsules containing 0.4 or 0.5 grammie

(6 to 7.5 grains) were given twice or thrice daily. Unpleasant symptoms, such as headache, anorexia, and vomiting, were in some cases observed to occur after internal administration. Methylene blue is believed to be as useful as quinine in the treatment of malarial fevers, although in some instances it may prove ineffectual; as its use is, however, attended with certain unpleasant effects, it should be reserved for cases in which quinine fails. Kétli, of Budapest, ¹¹³⁰_{B.S. II 1; July 23}, ⁵⁷ unsuccessfully employed the drug in five cases, in hourly doses of 0.1 grammie (1.5 grains) five or six times, as many hours in anticipation of the paroxysm. While it appeared to control the paroxysm, it did not prevent recurrence; so that ultimately quinine had to be substituted. Its use was also attended with irritability of the gastro-intestinal and genito-urinary tracts.

Neumann, of Budapest, ⁶²²_{N.S. I; June 5}, ⁴¹ has used methylene blue in 3 cases of malarial fever. In 2 recovery ensued; in 1, improvement. Not only were the paroxysms controlled, but the size of the spleen was also reduced. The medicament was given in doses of 0.1 grammie (1.5 grains) five times daily, at regular intervals. Dabrowski ⁵⁸⁶_{N.S. II; May 15}, ⁶⁷ confirms the favorable results obtained by other observers with methylene blue. Six cases were thus treated. Each received 0.50 grammie ($7\frac{1}{2}$ grains) daily, or 0.125 grammie (2 grains) at a dose. In five a cure resulted in the course of a few days, the fever subsiding, the spleen returning to its usual size, and the plasmodia disappearing from the blood. It is not believed that methylene blue acts directly upon the organisms, but rather that it renders the blood unsuited to their presence. No bad effects were observed. In one case nausea and vomiting appeared, but ceased on the withdrawal of the drug. In all of the cases the urine became of a greenish-blue color.

Ferreira, of Rio Janeiro, ⁶⁷_{June 15}, treated upward of forty cases in children, with methylene blue, with entirely satisfactory results. The dose employed varied from 0.25 to 0.50 grammie (4 to $7\frac{1}{2}$ grains), in the course of twenty-four hours, according to the age of the patient and the severity of the attack. The drug was of especial value in protracted and obstinate cases that resisted treatment by other means, and in cases of intermittent and remittent not sufficiently severe to be of immediate danger to life. In pernicious cases it would be judicious to join the subcutaneous

injection of quinine bishydrochlorate. The drug was readily taken and well borne, even by the youngest of infants, occasioning no unpleasant manifestations. In this respect it has a distinct advantage over quinine. The belief is expressed that the medicament exercises its curative action upon the malarial organisms, upon the infective process, as manifested by the disappearance of the characteristic symptoms, particularly the enlargement of liver and spleen. The drug appears to have mild antithermic properties. Its administration should be continued for several days after the subsidence of the fever and the disappearance of the other symptoms. It may be given in solution in syrup of orange-peel and syrup of canella. To larger children it may be administered in tablet, cachet, or capsule.

Moncorvo, of Rio Janeiro,^{14 Jan. 15} tried helianthus annuus and methylene blue in the treatment of malarial fever in children. Sixty-one children were treated with helianthus, in the form either of an alcoholic tincture or of an alcoholic extract. Of the former, from 1 to 10 grammes ($\frac{1}{2}$ to $2\frac{1}{2}$ drachms) were given daily in divided doses in a potion, and of the latter, from 1 to 6 grammes ($\frac{1}{2}$ to $1\frac{1}{2}$ drachms). The remedy was well borne, even by the youngest infant. In the majority of cases the cure was as prompt as with quinine. Methylene blue was administered to 36 children, varying in age from 23 days to 14 years. A cure was obtained in 10 cases, amelioration in 3, while in 14 the results were not conclusive. The drug was given in doses of from 0.20 to 0.40 gramme ($3\frac{1}{2}$ to 6 grains), in four equal parts, in the course of the day. The medicament was well borne and only in 1 case caused transient vesical tenesmus.

Du Cazal³⁵ _{n.s.2} indorses the method of treatment of intermittent fever proposed by Boudin. This consists in the administration at the outset of sufficient of a solution of 1 part of arsenious acid in 1000 parts of water to equal 1 grain (0.06 gramme), continued until symptoms of intolerance appear,—nausea, colic, vomiting, diarrhoea. The daily amount is so divided that equal parts are taken, in water or in milk, every quarter of an hour from 6 or 7 o'clock in the morning until 7 or 8 at night. Symptoms of intolerance usually appear in from three to five days. Then the intervals of administration are doubled. In from forty-eight to seventy-two hours the intervals are again doubled and once more after

another eight or ten days. Under this method of treatment relapses are said to be exceptional.

Strizover,³ _{Aug} in the case of a woman with enormous hypertrophy of the liver, of malarial origin, in which other measures failed to give relief, made hypodermatic injections of the officinal solution of potassium arsenite twice a week, at first in doses of 2 drops, gradually increasing the dose to 12 drops. The oedema commenced to subside soon after the first injection and had disappeared after the twelfth, while the size of the liver was greatly reduced. Menstruation, which had been in abeyance for three years, was established in two months, and the spleen, which also had been enlarged, returned to its normal dimensions. The injections in time failing to bring about any further improvement, they were discontinued and potassium iodide administered until the cure was made more nearly complete.

Dall' Olio⁵⁴⁵ _{Jan. 14; Feb. 15} formulates as follows the conclusions at which he has arrived as a result of the employment of phenocoll in the treatment of malarial fever: 1. The drug does not appear to have potent antipyretic properties as regards fever in general, but it is at least as effective as quinine in the malarial state. 2. Whereas quinine, in a great many instances, gives rise to toxic symptoms, such as ringing in the ears and cutaneous eruptions, phenocoll has not been found to give rise to such unpleasant effects. 3. Phenocoll succeeds in a certain number of cases in which quinine absolutely fails; this is of importance if only from the fact that difficulty might arise in obtaining a supply of quinine equal to the demand, whereas phenocoll is producible in any quantity. 4. The taste of the drug can easily be masked by means of syrup, and is not objected to even by children.

Cucco¹¹⁶ _{Apr., Sept.} ⁸⁰ has employed phenocoll hydrochlorate in the treatment of 84 cases of malarial fever, giving the drug a few hours before the anticipated attack. In 52 cases the result was satisfactory; in 21 doubtful; in 4 the drug failed; and in the remainder a definite conclusion could not be reached. Seven and a half grains (0.5 grammes) were given twice or thrice a day. Vincenzo, of Sassari, Italy, _{Nov. 29, 92} ³¹ has found phenocoll useful in 5 cases of grave malarial fever that would not yield to quinine. The individual dose was from 0.2 to 1.4 grammes ($3\frac{1}{2}$ to 21 grains), and the total amount used from 3 to 7 grammes ($\frac{3}{4}$ to $1\frac{3}{4}$ drachms).

Pruitt, of Russellville, Ark.,¹⁹² calls attention to the efficacy of a distilled extract of common Indian corn in the treatment of chronic malaria. After the corn has been gathered and well dried and freed from stems and mildew, 4 pounds (2 kilogrammes) of the husks, with 16 gallons (64 litres) of water, are placed in a still having a capacity of 20 gallons (80 litres). Ten gallons (40 litres) of the distillate are collected. The distilled extract is clear and transparent, and in odor and taste resembles boiled green corn. For purposes of preservation an ounce (31 grammes) of alcohol and half an ounce (15 grammes) of glycerin are added to sufficient of the extract to make a pint (0.5 litre). Of this mixture, the dose is from 1 to 2 teaspoonfuls every two or three hours. The medicament has not proved useful in cases of acute malarial infection, although it appears to act specifically in the chronic form of intermittent fever. The effects of the administration are speedily observed, the temperature soon declining, the irritability of the stomach subsiding, the action of liver and kidneys being favorably influenced, and the enlargement of the spleen being diminished. In many cases a mild diuretic effect may be observed.

VARIOLA.

Etiology.—Wiley, of Zumpango, Mexico, reports⁶, that variola is always present in that place, and epidemic every year from February to April. The natives consider it a disease of childhood, but it is said that in the epidemic of 1893 the mortality was 70 per cent. The natives are not revaccinated, and wear the blankets from the bed of a variolous patient.

By inoculating various culture-media with a bit of a recent variolous nodule and from dry preparations, Besser⁵³⁰,²¹ Nos. 6 to 10; July 16, was able to isolate bacilli 1μ long and 4μ thick, with rounded extremities, and which he believes to bear an etiological relation to the primary disease. The characteristics of the organism are said to be its slow growth in the thermostat, its failure to grow at the temperature of the room, the viscosity of its cultures and its arrangement in palisades.

Contagion.—Colclough, of Long Reach, Eng.,⁶ Oct. 1, 192, recites a series of cases that go to show that variola is little, if at all, contagious during the period of incubation and for a day or two after the eruption has appeared. The practical deduction is that the

most important steps to take in the stamping out of a threatened epidemic consist in the early recognition of the disease, the prompt isolation of cases, and the immediate vaccination or revaccination of all persons that have been exposed to infection and have not been successfully vaccinated within a period of two years. Coste, of Marseilles,⁹² calls attention to an abortive form of variola, characterized by headache, backache, nausea, vomiting, and fever, lasting for several days and followed by apparent recovery. Careful examination at this time, however, may succeed in disclosing the presence, in some unusual situation, of a papule or a small number of papules, which may pass through the typical stages of vesicle and pustule, or may gradually disappear without other alteration.

Diagnosis.—Savill² points out that the means upon which reliance may be placed in the diagnosis of variola before the appearance of the typical papular eruption include a suspicion that variola is or may be present in a given locality; the sudden advent of pyrexia in a previously healthy person; other constitutional symptoms; and the appearance of initial rashes.

Békésy, of Budapest,¹¹³⁰ has made a careful study of the out-patient records of the Stephanie Children's Hospital, at Budapest, with a view of shedding some light upon the question of the identity or non-identity of variola and varicella. He found that varicella is always prevalent in Budapest, averaging about 33 per cent. of the total morbidity among children. Until the year 1888 individual cases of variola occurred annually, except during the four years in which the disease assumed epidemic proportions. No relation could be made out between the number of cases of variola and of varicella, and the time of their occurrence in any one year or in a series of years. Cases both of variola and of varicella may occur, independently of one another and of the age of the patients, in the first years of life in equal degree. Varicella attacks the vaccinated and the unvaccinated alike, while variola is relatively rare in the vaccinated. The evidence is thus against the identity of the two diseases.

Gornall, of Warrington, Eng.,⁶ from a considerable experience, expresses the belief that the initial rashes of variola are comparatively rare. He divides them into four classes: (1) scarlatiniform, (2) morbilliform, (3) urticarial, and (4) petechial. Scarlatiniform eruptions are general in distribution, precede severe and

often rapidly-fatal attacks, and not uncommonly, though not invariably, are an early feature of purpura variolosa. Morbilliform rashes may be somewhat irregular in distribution, though their most characteristic situations are the face and the extensor surfaces of the limbs; they do not find their favorite positions in the groins and axillæ, as in the cases of the other initial eruptions. They occur only in discrete cases of a much modified character. Urticular rashes may appear upon the extensor surfaces of the forearms and legs, in front of the axillæ, and about the groins and the lower part of the abdomen. Petechial rashes appear to precede only cases of considerable severity, though not necessarily fatal.

Complications and Sequelæ.—Davezac and Delmas¹⁸⁸ have reported the case of an unvaccinated woman, 33 years old, who developed an attack of confluent variola consequent upon exposure to infection. As convalescence appeared about to set in, the patient was seized with a convulsion, attended with loss of consciousness, and followed by left hemiplegia, without impairment of sensibility. The palsy gradually subsided, but a pleuro-pneumonia developed upon the left side, requiring thoracentesis, which gave exit to about a pint of pus. The affected pleural cavity was treated with repeated irrigation, and manifested a tendency toward improvement. An hour after such an irrigation, however, the woman was again seized with a convulsion, and in a short time died. Upon post-mortem examination, in addition to the morbid condition of the left lung and left pleura, an area of softening was found in the right cerebral hemisphere, involving the upper and posterior portion of the ascending parietal convolution from the median fissure almost to the fissure of Sylvius, as well as the adjacent parts of the superior and inferior parietal lobules. In the midst of this area the third branch of the Sylvian artery could be seen. The opinion is expressed that the first convulsive seizure was dependent upon the formation of an infectious embolus, secondarily to which an encephalitis developed.

Mitra²³⁹ _{Apr. 16} reports 22 cases of articular disease observed at the Kashmir State Hospital in 1892 in the sequence of variola. The symptoms were characteristic of acute arthritis, suppuration taking place very rapidly, with partial or complete luxation. The elbow was the usual seat of inflammation. In several cases almost all of the large joints were affected. This acute infective arthritis is very

resistant to treatment. In the majority, free opening, drainage, and rest yielded satisfactory results. Excision was necessary in two elbow-cases and one knee-case, and in a little patient amputation of the arm had to be performed in order to avoid death from diffuse suppurative inflammation, extending from the elbow to the wrist, with gangrene spreading very rapidly. In excision of the elbow, a posterior straight incision was made, and anterior angular splints were used. All of these cases of joint-disease came under treatment at a late stage; consequently, ankylosis, even after free incision and drainage, could not be avoided in several cases.

Auché, of Bordeaux,¹⁴ has reported two cases of variola complicated by purulent peritonitis. One occurred in a girl of 19; the peritonitis was generalized, and developed during the period of suppuration of an attack of coherent variola. Two varieties of micro-organisms were found in the pus,—the streptococcus pyogenes and the staphylococcus pyogenes aureus. The internal and external genital organs and the other abdominal viscera were healthy, and, in the absence of any other focus of infection, it was concluded that the pyogenic micro-organisms were conveyed to the peritoneum through the intermediation of the blood-current. The second case was in a woman of 34, and terminated fatally. After death, which took place during the stage of desquamation of an attack of discrete variola, one of the ovaries was found suppurating, in conjunction with a purulent pelvic peritonitis. Only the streptococcus pyogenes was found in the pus. The vagina, the tubes, and the uterus appeared to be healthy.

Treatment.—Pepper, of Algiers,⁵ calls renewed attention to the utility of cocaine in the treatment of variola. In some instances the disease may be thus arrested; the disorganization of the blood is generally less rapid and less extensive; the fever is less severe and of shorter duration; the vesico-pustules and the pustules are frequently but incompletely evolved or partially aborted when cocaine has been regularly employed during the second stage of the disease; finally, the various visceral congestions and inflammations are less frequent and less intense. One drop of a 4-per-cent. solution may be administered in water, or otherwise, according to taste, four times in twenty-four hours for every year of age; thus, 5 drops to a child of 5, 10 drops to a child of 10, 20 drops to a person of 20, etc.

One-half of the dose given is frequently sufficient. The drug may be agreeably given in sweetened pastilles, each containing gr. $\frac{1}{4}$ (0.0025 gramme) of cocaine, with or without a small quantity of pepsin. Cocaine may also be given, at intervals of six or eight hours, in suppositories in doses corresponding to those given by the mouth. The hypodermatic administration is not recommended, except in the incipient stage, when the drug cannot be given by the mouth or the rectum. The dose should be one-fourth of that given by the mouth. Cases of variola display a marked tolerance to cocaine, but the effects of the drug should be carefully watched. This method of treatment does not exclude other therapeutic measures, either general or local; but in many cases in which cocaine is methodically administered no other treatment is required.

Auché, of Bordeaux,²⁵ July has employed serum from the blood of convalescents from variola in the treatment of two cases of variola, with inconclusive results. He first assured himself that the donors of the serum were free from transmissible disease, and that the serum itself was sterile and innocuous. The first case was in a girl, 14 years old, who had never been vaccinated and had not previously had variola. Six cubic centimetres ($1\frac{1}{2}$ drachms) of serum were obtained from the blood of a man, 51 years old, who had had an attack of variola a month and a half before, and this quantity was injected into the subcutaneous tissues of the girl's thigh on the third day. The attack, which at first threatened to be of great intensity, afterward pursued a mild and abortive course, and soon came to an end and was not followed by pitting. The second case occurred in a boy, 16 years old, who had likewise not been vaccinated. In this case the disease was a little farther advanced than in the first when the injection was practiced. Two injections were made with the serum from a man, 24 years old, convalescent from an attack of discrete variola, the first of 8 cubic centimetres (2 drachms), the second of 10 cubic centimetres ($2\frac{1}{2}$ drachms). In this case no appreciable effect upon the course of the attack was observed. The patient recovered, with slight or no pitting. In neither instance was the injection attended with noteworthy pain or discomfort.

Eade²⁶ suggests the application to the body of an ointment of sulphur or carbolic acid in case of exposure to variola or during the period of incubation of the disease. After the eruption has

appeared and the papules have begun to soften, benefit will result from the introduction of bactericidal agents into the individual papules. In the decadent stage, when desquamation is taking place, simple antiseptic inunctions should prove useful.

Vaccination, Vaccinia, etc.—By treating calves and goats with considerable quantities (from 1 to 2 grammes—15 to 31 grains) of vaccine-lymph, diluted with distilled water, by intra-peritoneal injection, Siegel, of Berlin,^{69 Jan. 12} succeeded in isolating a coccus or short bacillus from 1 to 1.5 millimetres (!) long and a little less thick. The inoculated animals were killed after the lapse of from four to eight days, meanwhile having presented no appreciable morbid phenomena. In every instance the peritoneum, particularly the mesentery, was found covered with a fibrinous deposit, while all over the peritoneal surface were scattered a large number of miliary nodules, and the mesenteric glands were in a state of acute inflammation, in places presenting haemorrhages. Spleen and kidneys presented no abnormality. The liver was always enlarged, and there were some areas of fatty degeneration and some small areas of softening. Upon blood-serum, inoculated with fluid from the liver and the enlarged lymphatic glands and placed in a thermostat, colonies of a single kind of organism developed in the course of two or three days. The organism also grew upon gelatin, without causing liquefaction. It was best stained with Kühne's carbolized methylene blue, being simply cleared in water, without the use of alcohol. Marked pigmentary infiltration of the liver, spleen, and lymphatic glands was observed and considered noteworthy. Goats treated by intra-peritoneal injection of large quantities of cultures of the organism, and destroyed four days later, presented appearances similar to those found in the animals treated with vaccine-lymph. To determine if immunity could be conferred by means of these organisms, as with vaccine-lymph, eight adults that had not been vaccinated within twelve years and three children in the first year of life were inoculated upon the arm with the cultures. The operation was followed by redness and swelling for the first three days, with subsequent subsidence of the local manifestations and the formation of a slight cicatrix. After the lapse of fourteen days the same persons were all vaccinated in the customary way upon the inoculated arm with vaccine-lymph. Of the eight adults a typical pustule appeared in but one. In the children the vacci-

nation pursued a typical course. In explanation of these results it is pointed out that the organisms may have lost in virulence in the process of cultivation, and were thus not of sufficient activity to confer immunity upon the susceptible infant, while still active enough to confer immunity upon the more-resistant adult.

Hervieux, of Paris,^{July 19} studied the influence upon the foetus of revaccination of the mother. Of 152 cases in which the mothers were revaccinated during the last months of pregnancy, and in which the infants were vaccinated soon after birth, in only 46 did the vaccination of the children fail. Experimental observations seem to indicate, in a general way, that immunization of the mother is only exceptionally transmitted to the offspring.

Manning, of Birmingham, Eng.,^{June 3} reports two cases of variola that strikingly illustrate the prophylactic value of vaccination. The cases occurred in sister and brother, aged respectively 11 and 3½ years, who had contracted the disease from the same source and had been subjected to the same surroundings and influences, excepting that the elder had had an attack of scarlatina some months previously. The first child had been vaccinated in infancy, and presented four scars. The eruption consisted of a few papules on the face and forearms, which never developed into true vesicles. No symptoms followed the eruption. The second child had never been vaccinated. It presented a confluent eruption, and died nine days after coming under observation. The photograph was taken on the thirteenth day of the attack of the first child and the tenth of that of the second child.

In a series of investigations as to the best methods of preserving vaccine-lymph for use in remote parts of the world, where it is impossible to establish vaccine-depots, and where fresh lymph from the calf cannot be employed, Surgeon-Major King^{Nov. 26, '92} found that, by mixing fresh lymph in certain proportions with anhydriated lanolin, a preparation could be obtained which retained its efficiency in all seasons and climates for a period of from forty to sixty days. King also sought to determine if he could secure a more-active lymph by passing small-pox through the calf. By careful watching he found that vesicles appeared at points distinct from that of inoculation; from these he collected lymph and vaccinated a second calf, and so on to the seventh calf, when, finding that the lymph in these successive generations was in no respect

different from ordinary calf-lymph, he caused to be vaccinated two children with some lymph from the seventh calf, the results of which were to be reported. In order to insure a perfect source of vaccine-lymph, Chambon and Ménard ¹⁰⁰ Dec 15, 1892 have found it advantageous to prepare, from the crusts obtained from a cow in which the eruption was a particularly typical one, a pulp with glycerin, which can be preserved for a number of weeks in a sterilized, sealed, glass tube.



SMALL-POX IN THE VACCINATED AND THE UNVACCINATED. (MANNING.)
London *Lancet*.

In this way it is believed that the ordinary pyogenic organisms die, while the activity of the virus remains unimpaired.

Wilson ²²⁹ July reports the employment of goat-lymph in vaccination. Of 150 men thus treated the result was successful in all but 11; on revaccination of these 11 there remained only 4 in which the operation failed. The same successful results were obtained in treating a number of other cases in the same way. Goat-lymph is believed to be superior to calf-lymph. It has the advantage of not being likely to transmit tuberculosis, as goats are rarely tuberculous.

Pohly, of New York,⁵⁹ describes an instrument that he has devised for facilitating the performance of vaccination. It consists of a handle of metal provided with five little sharp blades, fastened by a screw so that they can be extended or withdrawn to any desired length, and can be readily cleansed. It possesses the additional advantage that five incisions can be made with the same facility and in the same time as is required in the making of a single incision.

Complications of Vaccination.—Epstein³⁶⁶
B.33,p.442 reports 2 cases of purpura and 14 of erythema, developed in the course of 430 vaccinations. The cases of purpura occurred in children 12 and 4 months old, respectively, the haemorrhagic spots being of varying size, appearing four days after vaccination, gradually disappearing in the course of a week, and being preceded by agitation, insomnia, and fever. In the first child, which was rachitic, the spots occupied exclusively the left superior extremity, especially its extensor surface; in the second case they were distributed upon the extremities and the trunk. In both the vaccination proved successful, the vesicles at no time, however, being haemorrhagic. Five days after the attack of purpura measles developed in the first child, the eruption being quite distinct from the petechiae. Of the 14 cases of erythema, the eruption appeared in 1 on the fourth day, in 1 on the fifth day, in 1 on the sixth day, in 5 on the seventh day, in 2 on the eighth day, in 3 on the ninth day, in 1 on the tenth day, and in 1 on the eleventh day after vaccination. The distribution of the eruption followed no particular course. Most often it appeared about the inflammatory areola of the vesicle, and at the same time upon the extensor surfaces of the arm and forearm; often it appeared upon the postero-external aspect of the thighs, upon the thorax, and upon the sacrum. The erythema resembled the exanthem of measles. It developed in the course of from twenty-four to seventy-two hours, and persisted ordinarily for from six to eight days.

Perl, of Berlin,⁴₂₈ relates the case of a child, 2 $\frac{3}{4}$ years old, vaccinated for the first time. The child had been rachitic, slow in learning to talk, and had suffered a good deal with eczema, but at the time of the operation was in perfect health and well nourished. Four days later it became restless, complaining of pains in the abdomen and back and appearing feverish. On the

following day vesicles were visible at the site of vaccination. It was also noticed that the urine was scanty, turbid, brownish, and deposited a heavy sediment. On examination, its specific gravity was found to be 1016, and albumen in the proportion of $\frac{1}{2}$ per cent. was detected, together with blood coloring-matter. Microscopical examination disclosed the presence of red and colorless blood-corpuscles and numerous hyaline, epithelial, and blood tubercasts. With rest in bed and a milk diet these manifestations disappeared in the course of a week and the child recovered perfectly. The vaccination in other respects pursued its usual course. Three other children that were vaccinated at the same time presented no abnormal manifestations. At a meeting of the Clinical Society of London, Colecott Fox² _{Feb 18} read notes of two cases of generalized vaccinia. In each instance the case was the only one thus affected of many vaccinated from the same source, and the primary vaccination ran a normal course; on about the ninth day, however, the vaccinated arm became covered with a dense aggregation of supplementary vesicles. These were quickly followed by others, disseminated singly or in twos and threes over the unbroken skin of the scalp, face, trunk (front and back), and limbs. Fresh lesions were evolved for two or three days, and then abortive pustular lesions until the twenty-fifth day in the first case, and until the eighteenth day in the second. Hardly any scarring resulted, and the mucous membranes escaped.

In a report on vaccination in Indo-China, Marchoux⁸⁷⁹ _{May 20, June 17}² relates three cases of varioloid or varioliform eruption following vaccination with vaccine obtained at the Vaccine Institution at Saigon, where buffaloes are used as vaccinifers. This vaccine is known to possess exalted virulence. In the first case, in a child, about fifty umbilicated pocks developed upon various parts of the body simultaneously with the development of the vaccine-pocks. The child had some backache and a little fever. The second case, also in a child, presented twelve umbilicated pustules, which likewise developed at the same time and rate as the vaccine-pocks. The fever was considerable. In the third case, in an adult, numerous other spots appeared at the same time as the vaccinal pustules, ultimately about one hundred pustules being scattered over the body. There was considerable fever; the patient was delirious and confined to bed. In all of the cases inquiry failed to

elicit any evidence that the patients could have been exposed to variolous infection.

Millard ¹⁴ reported the case of a woman in whom, in the sequence of a revaccination, both vaccinia and variola developed, although she firmly declared that she had not had any relations with a variolous patient.

In a study of the inter-relation of variola and vaccinia Cope-man ^{22 June 14} satisfied himself that inoculation with the virus of either small-pox, calf-lymph, or human lymph was equally protective against subsequent inoculations with any of the other, and also that local manifestations were not essential to the general constitutional effect. This conclusion was confirmed by the immunity occasionally observed in calves after apparently negative or unsuccessful attempts at variolation; in infants whose mothers had been attacked by small-pox in the latter months of pregnancy; and by experimental vaccination with lymph that had been subjected to a heat sufficient to destroy all extraneous microbes and to render plate-cultures with it invariably sterile. The result in these last cases suggested the presence of an antitoxin rather than of a living organism as the immediate cause, and that this might be contained in the blood-serum of animals rendered immune.

YELLOW FEVER.

Diagnosis and Treatment.—Domingos Freire ²⁰⁴⁸ points out the elements of differentiation between so-called bilious fever of hot countries and yellow fever. A typical case of yellow fever presents three distinct stages: A febrile period lasting, on an average, from twenty-four to forty-eight hours; a period of apyrexia of variable duration, but always short; and a third period, in which the temperature again rises and the haemorrhagic and ataxoadynamic phenomena appear. Bilious fever, on the other hand, pursues a course frankly periodic, either intermittent or remittent,—in the first case with distinct paroxysms, in the second with febrile exacerbations that manifest themselves in the evening or at night. In bilious fever jaundice is a constant phenomenon, and appears from the outset; while in yellow fever the yellowish dis-coloration does not appear until the third stage or toward the close of the second stage, and sometimes not until after death has taken place. In bilious fever the facies is not that of a drunken man,

Fig. 1



Fig. 2

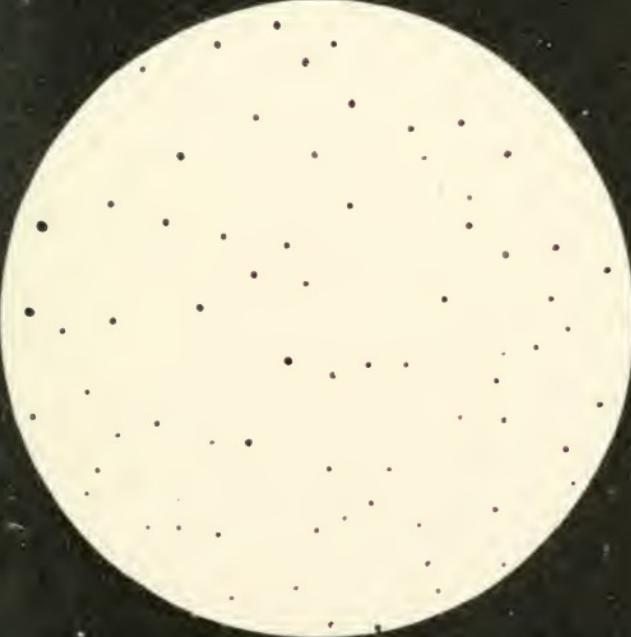


Fig. 1, Bacillus of Bilious Fever of Hot Countries; Fig. 2,
Micrococcus Xanthogenicus (Freire).

Origine Bactérienne de la Fièvre des pays chauds.

such as, to the practiced eye, is characteristic of yellow fever. In bilious fever the vomited matters are yellowish or greenish from the beginning and the vomiting subsides with the fever. In yellow fever the vomited matters are at first watery, toward the close becoming black or blackish, resembling burnt paper or soot, and not subsiding with the fever. In bilious fever the stools are yellowish or greenish in color, sometimes throughout the whole course of the illness, while in yellow fever there is constipation and only toward the close diarrhoea. Bilious fever cannot be considered infectious and is prone to recur and relapse, while yellow fever is contagious and not prone to recur. In yellow fever the spleen and the liver preserve their normal volume, unless they have already undergone changes from other causes, such as malarial infection. In bilious fever there is hyperæmia and congestion of liver and spleen; in yellow fever these organs undergo fatty degeneration, which is not the case in bilious fever. The salts of quinine possess distinct therapeutic value in cases of bilious fever, but none whatever in yellow fever. Freire succeeded in cultivating, from the urine, the blood, and the bile of cases of bilious fever, a bacillus (?) 9μ long and 3μ thick, by inoculation of a culture of which he induced intermittent fever in a guinea-pig, which, in turn, presented the same organisms in its blood and kidneys and liver, and which is believed to be the etiological factor of the disease. In contrast, a colored illustration is presented of the micrococcus xanthogenicus (*Microcoque xanthogénique*), which Freire holds to be the etiological factor in the development of yellow fever.

Salierup, of New York,⁵⁹ formerly a member of the Board of Health of Porto Rico, describes four types of yellow fever, based upon a personal experience of twenty-two years: (1) inflammatory, in which the predominant symptom is high temperature, which sometimes reaches an elevation of 105° F. (40.6° C.) at the outset; (2) nervous, in which in the third stage the symptoms of cerebral irritation, as delirium, tremor, cold skin, are the most prominent manifestations; (3) haemorrhagic, in which black vomit and other black evacuations are the most dangerous early symptoms; (4) typhoid, in which the disease in its third stage assumes features characteristic of the typhoid condition. The treatment pursued, in cases seen on the first day of the disease, consisted in the administration of 10 grains (0.65 gramme) of calomel, followed

by a saline cathartic three hours afterward; as soon as the desired effect had been produced, the patient was directed to take a cupful of hot lemonade containing from 5 to 10 grains (0.32 to 0.65 grammes) of potassium bitartrate every hour until abundant perspiration took place. This was kept up by the continuous administration of the lemonade for several days, when ordinarily the fever had subsided and convalescence was established. Otherwise the treatment was largely symptomatic.

INFECTIOUS FEBRILE ICTERUS—WEIL'S DISEASE.

Jaeger, of Stuttgart,⁵⁸ Dec. 9, 192 reports ten cases of infectious febrile icterus (Weil's disease), of which three terminated fatally. In most of the cases he succeeded in isolating, from the urine during life and from the tissues from two of the fatal cases examined post-mortem, an organism which it is believed acted as the cause of the disease. Inoculated upon lower animals this organism caused lesions analogous to those found in man, and from these again the same organism could be isolated. The organism is a short rod, sometimes looking like a coccus, slightly curved and provided with cilia that give it motility. It grows in various culture-media, to which it usually imparts a greenish fluorescence, sometimes causing liquefaction, at other times not. It can be stained by first treating it with Kühne's methylene blue, then briefly with dilute hydrochloric acid, and finally with aniline-oil; or by treating it with carbonized fuchsin for from three to five minutes, then with acetic acid (1 drop to 30 cubic centimetres—1 ounce), and finally with alcohol. No spores could be found. "Bacillus proteus fluorescens" is the name proposed to designate the organism. The noteworthy lesions found post-mortem were jaundice, fatty degeneration of the liver, with interstitial small-celled infiltration; acute parenchymatous nephritis, with fatty degeneration and cellular infiltration; haemorrhages into various organs; and enlargement of the spleen. In one case there was marked injection of the intestinal vessels, with numerous haemorrhages and superficial erosions of the mucous membrane, from the oesophagus to the ileo-caecal valve. Of the 10 patients 7 gave a history of having bathed in the river, while 2 more had partaken of food that might have been contaminated. All but one occurred in summer. This one alone was in a female, and the attack was ascribed to "taking cold." The stream in

which 7 of the patients had bathed was found to be defiled, and further investigation disclosed the fact that in a village bordering on a tributary stream an epidemic disease prevailed among the fowl. Examination of these animals revealed the existence of lesions similar to those encountered in cases of Weil's disease, together with the presence of the organisms found in the cases in man, and which again, by inoculation, could be transmitted to other animals, producing in turn characteristic lesions. The results of this most elaborate study are thus analyzed: 1. Febrile icterus (Weil's disease) is an acute infectious disease symptomatically, anatomically, and etiologically displaying a well-defined disease-picture. 2. The disease bears no relation to enteric fever, relapsing fever, or septicæmia (dependent upon staphylococci or streptococci). 3. It bears a closer relation to acute yellow atrophy of the liver and yellow fever; etiological investigation must determine whether or not it is identical with the one or the other of these. 4. The cause of the disease resides in bacteria belonging to the pleomorphous proteus group. 5. A specific pathogenic variety of proteus is not to be demonstrated; perhaps it may be that all forms of proteus can be viewed as in some degree pathogenic. 6. The pathogenicity of the different varieties of proteus varies greatly with the surrounding conditions. 7. Among the factors that increase the virulence of proteus bacteria are repeated passage through the animal organism, high temperature, the presence of a large amount of nitrogenous matter in the culture-medium, and possibly the presence of certain other bacteria. 8. Under the favorable conditions named the proteus may assume pathogenic activity in a restricted sense.—*i.e.*, it may gain entrance into the blood and tissues of the body and undergo multiplication. 9. All putrid nitrogenous substances, meat, fish, befouled water, may cause not only intestinal derangement, but also profound septic infection. 10. Of the cases included in this report the majority must be attributed to bathing in contaminated water. 11. The contamination was secondary to an epidemic of disease among fowl. 12. The cause of this disease is also a variety of proteus that is not to be distinguished from that found in cases of Weil's disease. 13. The organism was demonstrable in the water of an adjacent and tributary stream. 14. Its presence sufficiently explains the relation between bathing and infection. 15. Contamination of flowing

streams with soiled and infectious discharges should not be permitted. Cultures of the bacillus proteus fluorescens are shown in the annexed plates in the following order: Figs. 1, 2, and 4, gelatin plate-cultures (Fig. 1 showing early and Fig. 2 late appearances); Figs. 3 and 8, gelatin stab-cultures; Fig. 7, non-liquefying stab-culture; Figs. 5 and 9, smear-preparations from urine (Zeiss $\frac{1}{2}$, Oc. 4); Fig. 6, smear-preparation from pure culture (Zeiss $\frac{1}{2}$, Oc. 4); Figs. 10 and 11, klatsch preparations.

RELAPSING FEVER.

Ouskow¹¹⁰¹ has reported the results of observations made in two epidemics of relapsing fever at St. Petersburg, the one in 1885-86, the other in 1890-91: the first comprised 794 cases, the other 1874,—a total of 2668. The mortality of the first epidemic was about 4 per cent., that of the second about 6 per cent.; the mortality was higher in females than in males, in the proportion of 8 to 5 for the first epidemic and of 7 to 5 for the second. In both epidemics, and especially in the second, it was the lower classes that were first affected,—the poor, the worthless, the homeless, the occupationless,—and of these as many males as females. The diagnosis was based upon the presence in the blood of the spirocheta of Obermeier. In both epidemics death occurred especially during the first stage, and principally at the end of the first paroxysm, more rarely after the second, and very rarely after the third. After death hyperplasia of the spleen, with multiple infarction, was the lesion most commonly found. The appearance of infarcts afforded an indication of the number of paroxysms and the period of the disease. In some cases softening of the infarct occurred, with inflammation and adhesion to adjacent structures, such as the diaphragm, with the development of pleuritis. In two cases rupture of the spleen took place, followed by peritonitis. In the liver, as in the spleen, dilatation of the vessels was a common feature. In most cases an increase in the number of colorless blood-corpuscles of variable degree took place during the paroxysm. After the crisis, and oftener a short time in advance of the crisis, the number of colorless corpuscles underwent a sudden diminution. The increase involved especially the polynuclear elements. The most-characteristic phenomenon was the reversal of the proportion between the number of small lymphocytes and that of the large mono-

Fig. 4



Fiat

Fig. 2



Fig. 3.



Fig. 7.



Fig. 8.



Febrile Icterus - Weil's Disease (Jaeger).
Zeitschrift für Hygiene.

Fig. 5

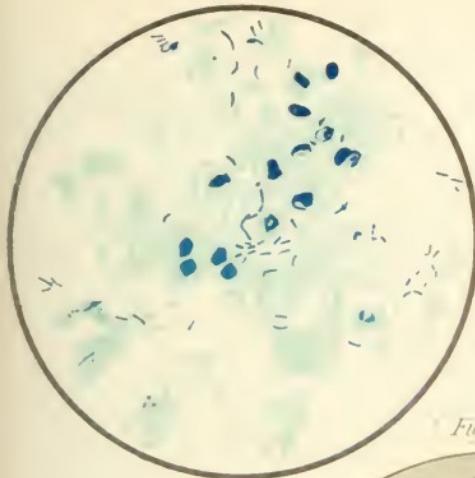


Fig. 10



Fig. II

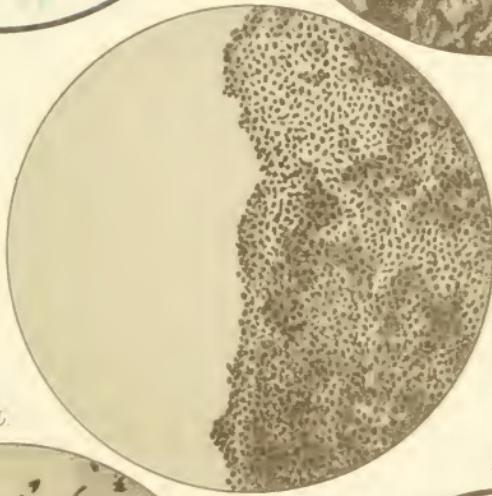
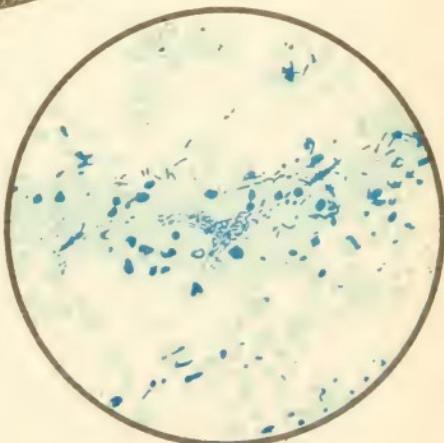


Fig. 6



Fig. 2



Febrile Icterus-Weil's Disease (Jaeger)
Zeitschrift für Hygiene

nuclear elements; both were present in almost equal number, the small lymphocytes sometimes even in the larger number. After the crisis there was not only a diminution in the total number of colorless cells, but a change in the proportion of the different varieties. The polynuclear elements fell to about 60 per cent. of the total; while the number of small lymphocytes exceeded (sometimes fifteen times) the number of large mononuclear elements. The increase in the number of large mononuclear elements may be ascribed to the changes induced in the spleen (in which organ, probably, the small lymphocytes are transformed into large mononuclear elements, passing thence into the blood). The increase in the number of the small lymphocytes may be explained by the changes that take place in the lymphatic glandular apparatus.

ANOMALOUS FEVER.

Connolly, of Brisbane, ²⁸⁵_{May 15} has observed 44 cases of continued fever consequent upon immersion in flood-waters. The main symptoms, besides elevation of temperature, continuing generally for less than a week, were constipation, headache, and backache. In 6 or 7 cases there was jaundice, with clay-colored stools; and in a few cases there was tonsillitis. Two of the cases terminated fatally; both presented jaundice. In almost all of the cases there was a history of prolonged immersion. The condition was more common among males than among females. No form of treatment appeared to have any influence. Jackson ²⁸⁵_{May 15} observed that small wounds that had been bathed in flood-waters seemed to be prone to a mild form of erysipelas. Hirschfeld ²⁸⁵_{May 15} reports having found a streptococcus in the excretions from cases of the kind described.

MEDITERRANEAN FEVER.

Bruce ²_{July 8} describes the micrococcus melitensis, which he, with others, believes to be the specific etiological organism of Mediterranean fever, as round or slightly oval in form, and measuring, in dried preparations, about 0.33μ in diameter. For its detection a magnifying power of 1000 or 1500 diameters is required. Viewed in a drop of water, unstained, the microbes are seen as bright points in active molecular movement; the great majority of them single, a few in pairs, and sometimes in chains. They possess no power of spontaneous movement. They can readily be

stained in a watery solution of gentian-violet, but they become decolorized by Gram's method. Treating specimens with alcohol at once removes all color from the micro-organisms, even after fixing them with osmic acid, corrosive sublimate, or tannic acid. In nutrient peptonized broth, kept at 37° C. (98.6° F.), no change can be seen for the first few days, but after some time the fluid becomes decidedly cloudy without any formation of pellicle on the surface. The best medium for the cultivation of this species is ordinary 1.5-per-cent. peptonized agaragar beef-jelly.

Hughes⁶ _{Dec. 3, 192} details the results of eighteen months' work in Malta devoted to a study of the affection variously described as Malta fever, Gibraltar fever, rock fever, Neapolitan fever, Mediterranean fever, etc. He found the disease characterized clinically by a peculiarly irregular temperature-curve, consisting of intermittent waves of pyrexia of a distinctly remittent type, each wave lasting from one to three weeks, with generally an apyrexial interval of two or three days. In rarer cases the remissions may become so marked as to impart an almost intermittent character, but distinguishable clearly from the paroxysms of ague. This pyrexial condition is usually very chronic, lasting even six months or more, and is not markedly affected by quinine or arsenic. It is usually accompanied by obstinate constipation, progressive anaemia, and debility, and is followed, in a large number of cases, by very chronic neuralgic and rheumatic complications, from which the patient may not recover for perhaps two years. The death-rate is very low; but the average stay in hospital is from seventy to ninety days. The peculiar micro-organism already described by Bruce and Gipps was found in the spleen. Westcott² _{July 8} describes some of the complications that may arise in the course of Mediterranean fever. The onset of the disease may be insidious or sudden, with fever of remittent type, simulating that of enteric fever; but the temperature soon becomes irregular, and, generally toward the end of the second week, the concomitant constitutional symptoms commence to disappear, the tongue cleans, the appetite returns, the mental condition improves, and convalescence appears about to set in; but the temperature remains high, and at any moment the patient is liable to suffer from a complication resembling rheumatic fever; the joints swell and become painful, and the constitutional symptoms of fever return,

but the characteristic perspiration of rheumatic fever is absent, and there is evidently no relation to it. This complication, like every symptom of this disease, is of the most uncertain duration and degree; it may attack only one or two joints and last only a day or two, or it may cause permanent joint disease. Local paralysis occurs frequently. The extensor muscles of the feet are those almost exclusively affected.

In a second paper Hughes² points out that the Maltese suffer proportionally less from Mediterranean fever than British troops, though the disease does not appear to show that special predilection for new-comers that is so commonly noticed in the case of enteric fever. The frequency has, on the whole, slowly but steadily diminished among the troops in Malta during the past 75 years, owing, doubtless, to constant sanitary improvements in barracks. The mortality has likewise declined, and epidemics of note have become fewer. Though intermittent fever does not exist in endemic form at Malta, the seasonal prevalence of Mediterranean fever corresponds exactly with that of malarial infection. The fever is certainly not contagious from man to man, and, both in localization and general clinical character, it has a close analogy to enteric fever. There is no evidence that infected food or drinking-water has any causal connection with the fever, and the introduction of a pure water-supply, under pressure, has not lessened its prevalence at Valletta. The facts point to an air-borne virus on shore, related to defective drainage. The conclusion is finally reached that, though closely allied to enteric fever, Mediterranean fever belongs to the mobile group characterized by an uncertain duration, a tendency to relapse and a feeble power of conferring immunity to subsequent attacks, and that it is a link between enteric fever and the so-called malarial marsh-fever (intermittent ague).

WEST AFRICAN "BLACKWATER" FEVER.

At a meeting of the Pathological Society of London, Wheaton², presented preparations from organs taken from cases of so-called West African "blackwater" fever. The disease occurs in those who have previously suffered from malarial fever, and is excited mainly by exposure to chill or extreme heat. The patient, after a preliminary stage of shivering, numbness of the extremities, pain in the loins, and general malaise, develops general jaun-

dice, fever (the temperature rising to 103° F. (39.5° C.), and passes porter-colored urine. The attacks recur again and again after fresh exposure to the exciting cause, and are often followed by nephritis and haematuria. In grave cases bilious vomiting occurs, and death with symptoms of uræmia. The urine is acid, and contains haemoglobin, but blood-corpuses are absent. Enlargement of liver and spleen is not common. From this description it is seen that, with the exception of the development of bilious vomiting and its high mortality, the disease has a close resemblance, clinically, to paroxysmal haemoglobinuria. The preparations showed that the tubules in the pyramids of the kidneys were full of masses of haemoglobin, with which the lumen of the secreting tubules was also packed. The cells of the secreting tubules were also swollen and granular. There were no extravasations of blood-corpuses. The spleen contained collections of haemoglobin in an amorphous form, and the hepatic cells were full of granules of pigment.

PEACH FEVER.

Anderson, of Hagerstown, Md., ^{May 6}, calls attention to a condition not infrequently observed among persons engaged in packing and canning fruits. Two types of the affection are observed: (1) the psychotic variety, which is observed in persons having a lively imaginative faculty, and is characterized by mental exaltation and ideas of grandeur; (2) true peach fever, caused by contact with the fruit in the course of its being picked and packed for the market. The latter is believed to be a morbid condition of the respiratory and cutaneous surfaces, with some consequent systemic disturbance, due to irritation from the pubescence of the skin of the common peach,—the *Amygdalus Persica*. The Schneiderian membrane first becomes irritated and tumefied, and yields a large flow of serum and mucus. The frontal sinuses, the conjunctivæ, and the larger bronchi may, by extension, be likewise affected. In susceptible subjects, cough and asthma may be excited. On the skin the chief manifestation is found about the wrists, forearms, neck, and forehead. It commonly begins and ends as a macular or papular eruption, but it may advance to a true dermatitis and to pustulation. The temperature may rise as much as 2° F. (1.1° C.), as a result of the systemic disturbances induced by the respiratory and cutaneous irritation. Thin-skinned and neurotic young women suffer

more commonly and for a longer time than pachydermatous men and the older women. Those who have been engaged in the business for some years seem to have become proof against the irritant. There is no evidence to show that the disorder is contagious.

INTERMITTENT FEVER OF HYSTERICAL ORIGIN.

Coquet, of Bordeaux,^{ISS, Sept. 3} has reported the case of a woman, 28 years old, in which, after an emotional disturbance during the menstrual period, menstruation was suppressed and violent headache appeared, with intense epigastric pain, to which vomiting became superadded. Soon it was observed that paroxysms of chill, fever, and sweating occurred regularly, at first on alternate days and subsequently on every third day. These attacks were followed by drowsiness, but the sleep was restless and disturbed, the patient talking a good deal. These symptoms had persisted for some three months, despite the administration of quinine. When the patient came under observation the possibility of hysteria at once suggested itself, and on careful search several stigmata were found. It was learned that, three years previously, following an operation upon the nose, there had been a similar disturbance of sleep, with febrile manifestations. The arch of the palate was rather pointed and the pharynx was anaesthetic. The lobule of the ear was adherent to the adjacent tissues. There were painful points below the breasts and over the ovaries. The visual fields were not restricted. Therapeutically, potassium bromide was administered during the day and bread-pills half an hour before the usual time for the occurrence of the paroxysm of chill, fever, and sweating. Under this treatment excellent progress was made, and the cure was finally rendered complete after the giving of a course of douches.

TEXAS FEVER.

In examinations of over one hundred cases in fourteen different outbreaks, Smith, of Washington, D. C.,^{50, 51} has found, within the red corpuscles of fresh blood from cattle affected with Texas fever, pale, rounded, protoplasmic masses, sometimes displaying amoeboid movement, which he believes to be the causative parasites of the disease (see ANNUAL for 1891). Occasionally, these bodies are spindle-shaped or pear-shaped; in the latter case, two, with their narrow extremities opposed, are often present in one

corpuscle. In the broader extremity a tiny, dark object, rarely replaced by a vacuole-like structure, is to be seen in the fresh state. The parasite is from 2.5 to 4μ long and from 1.2 to 2μ thick. It stains well on cover-slips with alkaline methylene blue. As a result of the presence of the organism the red corpuscles are destroyed. The proportion of parasites in the blood is seldom higher than 1 or 2 per cent., but when the animal dies or is killed in the febrile stage a large number of blood-corpuscles in the capillary areas of the various tissues are found to be infected. In the later stages of the fever, free parasites also are to be found. Cattle inoculated with the blood of diseased animals acquire the disease, presenting the earliest symptoms in the course of a few days. Other species of animals treated similarly remain healthy. Infection is conveyed through the agency of ticks, which are found upon the skin of the animals in large numbers, especially upon the inner aspect of the thighs and about the udders. The female drops off when ready to lay her eggs, and these are deposited upon the ground. The young crawl on to the cattle soon after their liberation and carry with them the infection. Meadows may be infected in the absence of cattle by strewing of the grass with pregnant ticks. The disease may be experimentally transferred from animal to animal by means of the ticks. The latter cannot exist below a certain temperature; frost destroys the eggs. The prevalence of the disease in the southern States of America is thus explained; its spread is to be prevented by destruction of the ticks.

MILK FEVER.

J. Howell Way, of Waynesville, N. C.,⁵ gives an interesting description of the affection known as milk fever. The disease appears both in animals and in man. In the latter, the onset is gradual and insidious; the patient becomes apathetic, and finds it impossible to arouse himself to his accustomed activity. Cephalalgia, anorexia, nausea, and marked thirst represent the early history of the disease. The tongue, at first covered with a white fur, becomes, after a few days, large, heavy, and flabby, the breath assuming a sweetish foulness comparable to the breath of an unweaned calf. Vomiting occurs frequently, and is attended with very little immediate relief. The fluid expelled from the stomach most frequently has a slightly bluish color, and is not, as a rule,

very abundant in quantity, many of the efforts at emesis being unattended with the ejection of any fluid whatever. The emesis ceases late in the course of fatal cases from sheer exhaustion, hic-cough being then a frequent source of suffering. The abdomen is flaccid, and peristaltic action seems to be suspended, although diarrhoea is sometimes observed. Marked aortic pulsation may sometimes be felt through the abdominal parietes. The frequency of cardiac action is not increased, as a rule; in the earlier and middle periods of the disease it may be at times slowed, but in the profound prostration that ensues prior to death it is increased and labored, and the larger arteries seem to be unusually well filled. The temperature is generally subnormal, ranging from 97° to 98° F. (36.1° to 36.7° C.). In grave or fatal cases the sufferer sinks into a comatose condition.

QUININE FEVER.

Krannhals²¹,_{Apr. 1} has reported the case of a woman, 22 years old, in which the administration of 0.2 grammie (3 grains) of quinine was followed by elevation of temperature, haematemesis, bloody stools, and marked prostration. The patient was quite well on the following day. A week later the administration of 0.2 grammie (3 grains) of quinine was again followed by a similar train of symptoms. After the lapse of several weeks 0.2 grammie (3 grains) of quinine were, with the consent of the patient, again experimentally administered, with the same result as followed the previous administrations. Rulle²¹,_{Apr. 1} also refers to a case in which the administration of 0.65 grammie (10 grains) of quinine was followed by an elevation of temperature to 40° C. (104° F.), together with the appearance of an evanescent rash.

INSOLATION.

Although several interesting papers upon this subject have appeared during the year, nothing especially new has been presented. Gannett, of Boston,⁹⁰,_{Apr. 20} and Koerfer, of Kreuzburg,⁶⁹,_{July 12} emphasized the value of chloroform to control the convulsions. In a case treated by the latter death seemed imminent, and the inhalation of chloroform was begun while preparations for a cold bath were being made. The result was surprising. The respiration soon improved and with it the action of the heart and the character of

the pulse. The tendency to spasm also disappeared. On the theory that the phenomena of insolation depend upon the action of the superheated blood upon the central and ganglionic nervous system, Koerfer⁶⁹, July 13, believes that the utility of chloroform resides in the power of the drug to diminish the irritability of the cardiac ganglia, in this way preventing the muscular fatigue upon which, it is held, the fatal heart-failure depends; it also acts as a sedative upon the remainder of the nervous system, controlling the convulsive tendency, thus lessening heat production and probably facilitating heat dissipation, and, finally, permitting the employment of other therapeutic measures directed to the reduction of the temperature and supplying water to replace that lost in consequence of the high temperature. If there is much respiratory disturbance, manifested by expiratory dyspnœa, Gannett advocates the administration of oxygen by inhalation. Interesting contributions have also been made by Heisler, of Philadelphia,¹¹² April, and Somerville, of Tuscaloosa, Ala.,⁵⁹ July 15, the latter's article being based upon twenty-two cases treated at St. Catharine's Hospital, Brooklyn, during the summer of 1892.

DIPHTHERIA, CROUP, PERTUSSIS, AND PAROTITIS.

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DIPHTHERIA.

NOTWITHSTANDING the fact that diphtheria has been so thoroughly investigated during the last few years in the medical centres and elsewhere, has been discussed in most of the medical societies, and remedies too numerous to mention having been employed, the general mortality from this disease does not appear to have materially diminished, and in some places it has increased. A recent French writer, deplored the fact that the population of France is diminishing, considers diphtheria to be one of the chief factors in this depopulation. In London, according to Gayler's statistics, diphtheria has gradually increased during the last decade, the following statistics showing the deaths from this cause in London:

Years.	Deaths.	Years.	Deaths.
1882	857	1887	953
1883	952	1888	1311
1884	951	1889	1588
1885	904	1890	1417
1896	851		

Clinical observations, cultures, and experiments of the past year have tended to confirm the theory already accepted by the leading bacteriologists and pathologists of Europe and America, that the term "diphtheria," as employed by Bretonneau and Troussau, has been applied to different pathological processes having a morphological resemblance. True diphtheria, pseudodiphtheria, and inflammatory processes resembling diphtheria are grouped as follows by W. H. Park⁵⁰: 1. True diphtheria. This is always caused by the Klebs-Loeffler bacillus, and presents the following forms upon the surface affected: (a) Pseudomembrane upon the faucial and perhaps buccal surfaces thick, firm, and incorporated

with the inflamed mucous membrane. It cannot be detached, except at an advanced stage of the disease, without causing haemorrhage. It is surrounded by inflamed (hyperæmic, infiltrated, and swollen) mucous membrane just as the crystal of a watch is surrounded by the rim. This pellicle causes superficial or deep necrosis of the mucous membrane with which it is incorporated, and is attended by the secretion of muco-pus, sometimes tinged by red blood-cells. (b) Cases in which the pseudomembrane is wholly or mainly in the larynx, or larynx and trachea, and extending perhaps into the bronchi. This, the croupous form of the disease, is very fatal. (c) Cases in which the pseudomembrane is moderate in amount, occurring upon the tonsils, and upon portions of the uvula and palate. The symptoms may be severe for a few days, but most patients with this form of diphtheria recover. (d) Those in which the pseudomembrane is limited to the tonsils. This form of diphtheria is mild. (e) Those in which the mucous membrane of the fauces, and perhaps elsewhere, is hyperæmic, swollen, and tender, but with no pseudomembrane, sometimes met with in those who have been exposed to diphtheria, but who have the disease so mildly that a pseudomembrane does not form. These mild and, for the most part, walking cases often infect others with a severe form of diphtheria. (f) Nasal diphtheria. The pseudomembrane is confined to the nostrils. Systemic infection is very likely to occur from nasal diphtheria, unless the nares be promptly and repeatedly disinfected.

Perhaps it is unnecessary to state again the commonly accepted theory that all these forms of true diphtheria are caused by the Klebs-Loeffler bacillus. This microbe has been described by many bacteriologists as having nearly the same length as, but ordinarily more than double the thickness of, the tubercle bacillus. Specimens of it seen under the microscope frequently present variations from the typical form, which are characteristic and of diagnostic value. Some present a granular appearance, and occasionally one has swollen extremities so as to have a dumb-bell shape; or one extremity is swollen so that the form is like that of a pear or gourd. Occasionally one of the bacilli is curved like a bow. These characteristics and peculiar colorations by reagents enable microscopists to distinguish this bacillus.

When the Klebs-Loeffler bacillus was shown to be the cause

of true diphtheria, the discovery was soon made that it did not ordinarily enter the system, but, remaining localized upon the inflamed surface, generated a toxalbumen, which, taken up by the lymphatics, entered the system, producing the blood-poisoning. Bacteriological investigations, however, during the last year have shown that occasionally the Klebs-Löffler bacillus does enter the interior of the system, and is found in internal organs, in those who have perished. A considerable number of microscopists have each reported one or more such cases during the past year, among them being Booker and Welch, of Johns Hopkins Hospital. ^{Oct., Nov., '92; Apr.} ⁷⁶⁴ P. Frosch ⁵⁸ states that he has found the Klebs-Löffler bacillus in the interior of the body in ten out of fifteen cases; that the bacilli were rarest in the liver, and most common in pneumonic areas,—the kidneys, spleen, lymphatic glands, and the heart's blood. In nearly every case there was a mixed infection of other kinds of bacteria, chiefly streptococci and staphylococci, occurring along with the Klebs-Löffler bacillus. Babes, Kolesko, Paltauf, and Spronek have also found diphtheritic bacilli in the organs of the body in single cases.

Pseudodiphtheria.—This term is applied to pseudomembranous inflammations of the fauces, or other surfaces, produced by the streptococcus and to a less degree by other forms of cocci. Park ⁵⁹ _{Feb., '11} recognizes the following forms of pseudodiphtheria: (a) Pseudomembranous pharyngitis. The faacial surface, to a greater or less degree, is covered by a grayish, fibrinous pellicle, like that in true diphtheria. It is usually thicker over the tonsils than elsewhere, and often extends to the uvula and pillars of the fauces. In mild cases the pseudomembrane may be confined to the tonsillar surface or other part of the fauces. The prognosis is good so long as the larynx is not invaded. (b) Inflammation of the laryngeal surface and the formation of a pellicular exudate. The pseudomembranous inflammation often extends to the trachea and bronchial tubes, and sometimes to the lungs, causing bronchial croup and pneumonia. This disease is very fatal from stenosis of the larynx and trachea, or from dyspnæa and prostration consequent upon the pneumonia. (c) Pseudomembranous inflammation of the tonsils, in which the characteristic exudate is limited to the tonsillar surface. Recovery is the rule. (d) Acute inflammation of the tonsils and fauces, without any fibrinous or pellicular exudate. Pseudo-

diphtheria, as well as true diphtheria, according to the observations of many physicians, sometimes occurs, so far as can be ascertained by a careful examination, without a fibrinous exudate upon any of the surfaces. [I have seen this in the children of a family in which pseudodiphtheria with the characteristic exudate was prevailing, as well as in those who had been exposed to true diphtheria.] (e) Pseudomembranous inflammation of the fauces, and sometimes of other mucous surfaces, occurs as a complication of certain infectious diseases. This complication is most frequent in scarlet fever and measles, but it occasionally occurs in other infectious or contagious maladies.

The opinion is expressed by certain observers that pseudomembranous inflammation supervening upon the catarrhal inflammation commonly present in an infectious disease, as in scarlet fever, measles, and pertussis, if it occurs in the beginning of the primary disease, is ordinarily due to the streptococcus, and is, therefore, a pseudodiphtheria; but if it occur in the declining stage of the malady, it is more frequently caused by the Klebs-Loeffler bacillus, and is a true diphtheria; but true diphtheria, indicated by the presence of the Klebs-Loeffler bacillus, may supervene at any stage of the diseases mentioned.

The subject of a mixed infection has recently received considerable attention. In true diphtheria in which the Klebs-Loeffler bacillus is the recognized causal agent, streptococci, or other forms of cocci, are commonly or frequently present. That they also exert a pathogenic influence cannot be doubted. Barbier^{157 Aug} states that we recognize certain results, occurring from the association of the streptococcus with the diphtheritic bacillus, infectious angina, bronchitis, and broncho-pneumonia being its habitual manifestations. Tracheotomy opens a new channel of entrance to such infection, which may, according to this author, in severe cases, cause a peritracheitis, phlegmon, erysipelas, or abscess. These results from the streptococcus, however, can only occur in the most severe cases. It is only exceptionally that inflammations of the kind mentioned supervene in diphtheria or pseudodiphtheria. A peritracheitis, phlegmon, erysipelas, or abscess, produced by the streptococcus in the course of diphtheria or pseudodiphtheria, would probably be fatal; but we know that a large majority of the cases of pseudodiphtheria and, with early

and quite correct treatment, a majority of cases of true diphtheria recover.

[It seems to me probable that in the United States pseudodiphtheria, caused by the streptococcus and other forms of cocci, occurred from an unknown period antedating the present widespread diphtheria, which was not observed, or was mild and infrequent, in the first half of the present century, so as to be overlooked. When true diphtheria began to occur in the decade commencing with 1850, the older physicians stated that they had previously observed similar cases, though less frequent and severe. Thus, in 1842, nearly a decade before diphtheria began to attract attention, Dr. John Ware, of Boston, published his well-known paper on croup, and in 74 of the 75 cases embraced in his statistics the membranous exudate was present upon the faucial surface. Had true diphtheria prevailed in America in the first half of the nineteenth century, it seems to me that it would have attracted attention, on account of the great mortality which attends it. It is commonly, and I think correctly, believed by American writers on diphtheria, that it was the genuine disease, caused by the Klebs-Löffler bacillus, which commenced near Boston in 1735, and extended westward over the British colonies, inasmuch as the first forty attacked died. This disease, new to the early settlers, extended westward, reaching the Hudson River and New York in two years, and after a time overleaped the barrier of the river. It gradually disappeared, attracting no further attention, except as an interesting historical fact, noted by Douglass, Bard, Colden, and others.]

Relative Frequency of Diphtheria and Pseudodiphtheria.—In the ANNUAL of last year the following statistics were given showing the relative frequency, ascertained by cultures, of pseudo-membranous inflammations caused by the Klebs-Löffler bacillus (true diphtheria) and those caused by the streptococcus and other forms of cocci (pseudodiphtheria):—

	True Diphtheria.	Pseudodiphtheria (due to Cocci).
Baginsky,	118 cases	36 cases.
T. M. Prudden,	0 "	24 "
M. Martin,	128 "	72 "
Wm. H. Park,	127 "	114 "

Prudden's 24 cases of pseudodiphtheria were chiefly from wards in which scarlet fever and measles had prevailed.

Carl Janson ³⁷⁰_{v.56,p.407} states that in 63 cases observed by him the Klebs-Loeffler bacillus was present, and in 37 it was absent. In 17 of the 37 the pseudomembranous inflammation was in close relation with, or supervened upon, scarlet fever, and in all the 37 cases cocci of various forms were present.

Mode of Introduction of Bacilli into the System.—Abbott and Griskey ⁷⁶⁴_{v.4,No.30} discovered, in their experiments on animals, that bacilli were mostly carried into the interior of the body by the lymphatics. After injecting the bacilli of diphtheria subcutaneously into the tissues of the abdominal walls and into the testicles of guinea-pigs, they found the bacilli in the leucocytes of the lymphatic channels in the omentum, but never in the leucocytes in the blood-vessels.

Diphtheria Produced by the Use of Impure Water.—W. A. McLachlan, of Dumbarton, ²¹³_{Sept.} says that, in his rural practice, in one instance diphtheria was traced to the water obtained from two sunken wells which received the drainage of several houses and an old grave-yard. After the health of the community had been restored by closing the wells and obtaining water from a fresh source, a return of the diphtheria was traced to the washing of milk-utensils with water from one of the wells. McLachlan relates several other cases showing the origin of diphtheria in drinking-water contaminated by sewage or faecal matter which, in some instances, had, in very unusual ways, percolated into the wells. He also states that in certain cases he has been able to trace an outbreak of diphtheria to the faulty, gaseous leakage of the sewage-pipe.

Klebs-Loeffler Bacillus in Membranous Rhinitis.—A. C. Abbott ²⁰⁸³ observed two cases of membranous rhinitis in sisters, evidently communicated from one to the other by direct infection. From one of them cultures of true malignant diphtheria were obtained, while from the other bacilli in every respect identical were derived, except for the power of killing guinea-pigs. It produced pathological lesions at the point of inoculation identical with those caused by the virulent Loeffler bacillus.

Embolism Following Diphtheria.—R. F. Rooney ¹⁴⁷_{Apr.} reports the following case: E. W., female, aged 7 years, took severe diphtheria of the fauces and nares. During twelve days she "hovered between life and death," and then began slowly to improve. She was extremely weak and had "impaired and irregular heart's

action," but, as she was beginning to improve, the doctor's visits were discontinued. Three days afterward the mother heard a gasping, smothered cry, and ran to the patient's bedside. She was cold, gasping for breath, pallid, and perspiring, and her hands were firmly pressed over the heart. The thoracic symptoms were soon relieved, but were followed by intense pain in the umbilical region, and coldness and numbness of both legs. By the use of stimulants and hot applications the umbilical pain passed off, and sensation was restored to the right lower extremity, and to the left from the knee upward. From the knee downward the limb was cold, bloodless, and shrunken. The surface generally was waxy, nausea constant; heart's action very weak, but regular; pulse, 140, scarcely distinguishable at the wrist; respiration, 22; temperature, 96° F. (35.6° C.) in axilla, 97.40° F. (36.3° C.) under the tongue; leg tightly flexed on the thigh, and incapable of extension from the great pain it caused. Diagnosis: complete occlusion of the popliteal artery, probably to be followed by gangrene if amputation be refused. Three weeks elapsed, attended by intense pain, gradual emaciation and loss of strength, and death seemed near. The thigh was firmly flexed on the abdomen and the leg on the thigh, and the predicted gangrene appeared. In this precarious state, when death on the operating-table was not unlikely, amputation was performed. During the operation the pulse and respiration ceased, but the patient was revived by artificial respiration and made a good recovery.

The gangrenous process began at the upper border of the patella, and descended on the side of the knee (both sides were much alike), by an irregularly-curved outline, to the top of the belly of the gastrocnemius muscle. The seat of the embolus accounts for the peculiar outline. The superior and inferior muscular branches of the popliteal have their origin just above the upper end of the clot, and were therefore free to supply the posterior aspect of the knee as far down as the point indicated. The anterior aspect receives its blood-supply from the inferior external and inferior internal articular branches of the popliteal and the recurrent branch of the anterior tibial arteries. These being occluded, the gangrenous process extended so high in front as to necessitate amputation at the point selected.

Klebs-Löffler Bacillus Found in Leucocytes.—S. Flexner ⁷⁶⁴_{Appl.}

states that cultures made from pneumonic areas occurring in diphtheria showed the presence of the bacillus of diphtheria, in addition to other microbes. "Cultures made from the lung proved the diphtheria bacillus to be one of the micro-organisms present. Our idea at that time was that the organisms were not actually derived from the parenchyma of the lungs; but it was probable that we had entered a small bronchus, which we knew had been invaded by the diphtheria bacilli, since a typical diphtheritic membrane could be made out in all the smaller bronchi. In the examination of subsequent cases, some time was spent in searching for bacilli in the broncho-pneumonic areas. In two instances I felt quite sure that I had found isolated diphtheria bacilli in them, but they were not there in large numbers. With regard to the phagocytic action of the leucocytes, in reference to the bacillus diphtheriae, it was observed, by Dr. Welch and myself, that not infrequently, when the bacilli were injected beneath the skin, the leucocytes took up some of them. In some instances these leucocytes preserved their normal appearance, while in others they appeared to be injured, the nucleus being destroyed or fragmented and the cells dead."

W. T. Howard⁷⁶⁴ relates the history of a Russian Pole aged 44 years. Previously well, he began to be sick November 1st, with a chill, high fever; pain in the head, abdomen, and limbs; nausea, vomiting, and diarrhoea. He remained in this state seventeen days, when his pulse became weak and rapid, and death occurred in collapse. The myocardium was firm and of a lighter color than normal. On the upper or auricular aspect of the mitral valve was a granular-appearing thromboid mass, irregular in shape, mottled red and white. The mass began below the base of the valve, and covered completely both segments. On removing portions of it with the finger, the endocardium was found to be rough, ulcerated, and haemorrhagic. On the under or ventricular surface of the posterior segment were several smaller points of ulceration, covered in places by the same fibrinous material seen on the upper surface. When the surfaces of the thromboid mass were brought together, the auriculo-ventricular opening was almost completely closed. A few small vegetations were on the aortic valves; the parietal endocardium was unchanged; the liver large and congested; the spleen large, soft, nearly the whole organ being the seat of an infarction; both kid-

neys exhibited the lesions of nephritis and infarctions. Cultures from all these organs showed the Loeffler bacillus. At the base of the valve the endothelial cells were lost, and above the thrombus was a large area from which they were absent, and where local reaction had occurred, as shown by the proliferation of the fixed cells of the part, and by an infiltration of the tissue by a large number of polynuclear leucocytes. At the edge and on the surface of the valve was a great number of the Klebs-Loeffler bacilli, which were not seen deeper than the first two or three rows of cells.

On the free surface of the thromboid mass was a thick layer of myriads of the Loeffler bacilli, and beneath this a layer of fibrin very poor in cells and containing clumps of bacilli. In the area of contact of the thromboid mass the endothelial cells were entirely lost, and at this place was a dense line of bacilli. Beneath the layer of bacilli the muscle-tissue of the valve was hyaline. The kidneys were extensively diseased, and the capillaries of the liver contained many bacilli, although no necrosis was observed in this organ. Welch, in discussing the above case, remarked : "We found in this case in pure culture, and in large number in the valvular vegetations, the spleen and the kidneys, a bacillus absolutely indistinguishable from the Klebs-Loeffler bacillus of diphtheria in its morphological and cultural properties. The two organisms have been studied most carefully side by side, in all sorts of culture media, and no distinction can be found between them. Dr. Howard's bacillus is not, however, pathogenic to guinea-pigs. Does this suffice to separate it as a distinct species from the genuine Klebs-Loeffler bacillus? According to the investigations of Roux and Yersin, Abbott, and others, the genuine bacillus diphtheriae may occur devoid of pathogenic properties, in animals used for experiments. If, then, we admit that Dr. Howard's bacillus is in reality the bacillus diphtheriae, we have the first recorded observation of a case of ulcerative endocarditis due to this organism, and we are reminded of the old name for this affection,—diphtheritic endocarditis,—a name, however, based on anatomical rather than etiological reasons."

Diphtheria in Typhoid Fevers.—W. T. Councilman⁵ states that pseudomembranous inflammations accompanying typhoid fever are more common than is usually believed, and are not more

frequently recognized on account of the hebetude of the patients. He relates a case in which the Klebs-Loeffler bacillus was found in cultures obtained from the pseudomembrane of a typhoid case.

Tetanus in Diphtheria.—Baginsky⁴ relates the following case: A boy of about 5 years was admitted under his care for inability to open his jaws properly and for stiffness in his limbs, which had been present for four days. It was impossible to examine the throat, and only an ulcer on the edge of the tongue, covered with a grayish pellicle, could be distinguished. There was marked trismus and recurring spasms of the muscles about the cervical regions. Hydrate of chloral, administered per rectum, had no influence, but the blood-serum treatment, carried out by Behring, had some effect on the paroxysms. On the sixth day after admission the patient developed a rash like scarlet fever; the pharynx could not be examined. Next day the eruption was marked, and a swelling appeared on the outside of the left knee-joint. On the eleventh day diphtherial ophthalmia set in, and an examination of the throat, now for the first time possible, showed redness without exudation, enlarged tonsils, and a slightly-infiltrated uvula. By this time the tetanic attacks had greatly lessened. Later the child had paralysis, and was apparently benefited by the treatment with blood-serum.

Diphtheria in an Infant Communicated to the Mother.—D. J. Caddy^{2 Mar. 4} relates the case of an infant of 6 weeks whose glands at the angle of the jaw were enlarged; pulse, 140; temperature, 103° F. (39.5° C.). The tonsils were very red, and a large white patch of membrane nearly covered the left tonsil and extended to the uvula along the soft palate. The child appeared to be very ill, and could scarcely take the breast, but it gradually recovered. Five days after the onset of the disease in the infant the mother became chilly and languid, and had pain and exquisite tenderness in the left breast and armpit. The breast was swollen, hard, and tense; the nipple projected more than usual, was hard, tender, and covered by a tough, grayish-white membrane, which extended toward the axilla to the outer edge of the nipple. On raising a little of the pseudomembrane a raw and bleeding surface was exposed. She, too, gradually recovered.

Diagnosis.—H. Bourges, of Paris,^{451 July} states that the most valuable clinical sign of diphtheria obtained on inspection of the fauces

is the presence of a fibrinous exudation, of a white or gray color, which is so adherent to the underlying tissues that its removal causes a bleeding surface of variable size. The pseudomembrane is insoluble in water, and is quickly reproduced. Soreness of the fauces is the first symptom of diphtheria in ordinary cases, and, if the pellicular exudate extend not only over the tonsils, but also upon the pillars of the fauces and uvula, there can be little doubt of the presence of this disease. Swelling of the cervical glands, pallor and prostration, albuminuria, and paralysis during convalescence corroborate the diagnosis. Bourges also indorses Troussseau's advice to make frequent inspection of the fauces of children in the course of a disease whenever the diagnosis is doubtful. In some cases, however, all the characteristic signs of diphtheria may be lacking. An accurate diagnosis of the presence or absence of diphtheria can be made within a few hours by the microscope, as shown by Park, who states²¹¹⁸ that in May, 1893, the Health Board of New York began the examination, by cultures, of all reported cases of suspected diphtheria, whenever the consent of the attending physician could be obtained. To obtain the cultures the medical inspectors or private physicians inoculate tubes of blood-serum from sterilized-cotton swabs just previously rubbed upon the suspected exudate. These inoculated tubes are collected by the department, placed in an incubator at 37° C. (98.6° F.) for twelve hours, examined, and the reports sent to the physicians. The examination of cultures from the first 2000 patients having suspected diphtheria showed that 1442 were cases of true diphtheria, the bacillus being present, and that 433 were cases of false or pseudodiphtheria. In the remaining 125 no diagnosis could be determined, as the cultures were either poorly made or were made after convalescence had been established. The great majority of the cases were in children under the age of 6 years. Forty-eight of the cultures came from cases of so-called croup, the pseudomembrane being confined almost wholly to the larynx. In 36 of these the diphtheria bacilli were present, in 12 they were absent. One-half of the cases of laryngeal diphtheria were either preceded or followed by other cases of diphtheria.

Another new feature of this work has been the examination of cultures made from convalescent cases of true diphtheria at different times, after the disappearance of the pseudomembrane or

exudate. In 245 of 405 cases thus examined the diphtheria bacilli disappeared within three days after the complete disappearance of the pseudomembrane or exudate; in 160 cases they persisted for a longer time,—namely, in 103 cases for seven days, in 34 for twelve days, in 16 for fifteen days, in 4 for three weeks, and in 3 for five weeks after the complete disappearance of all visible exudate. These facts have led the Health Department to make a rule that no patient shall be considered free from the danger of spreading the contagion of diphtheria until it has been proved by cultures that all diphtheria bacilli have disappeared from the throat. It has been found that those cases in which frequent irrigation with antiseptic solutions has been employed have, as a rule, become more quickly freed from the bacilli than those in which irrigation has not been used. The mortality in the cases of true diphtheria has been about 30 per cent.; in false diphtheria, about 4 per cent. Park found Loeffler's bacilli in the larynx, trachea, lung, and heart's blood of a child which died of diphtheria in the New York Foundling Asylum.

The technique of Tézenas^{151 Aug.} in the bacteriological examination of diphtheritic membrane is as follows: With a flat platinum wire, sterilized in a spirit-flame, the tonsils are scratched and the removed substance inoculated into two serum-filled tubes, which are placed in a thermostat at a temperature of 35° C. (95° F.). In about twelve hours colonies are seen.

It is proper, in this connection, to call attention to certain diseases which resemble diphtheria and are liable to be mistaken for it, some of them being apparently caused by microbes, and perhaps contagious. The following is a summary of these diseases as published during the year by distinguished clinical observers and pathologists:—

Follicular tonsillitis, characterized by inflammatory swelling of the tonsils and a general catarrhal inflammation of the tonsillar and usually of the faacial surface; a thick, white secretion exudes from the follicles of the tonsils, forming rounded masses of the size of a large pin's head. If two or more of these secretions coalesce, the appearance is like that of a diphtheritic or pseudodiphtheritic pellicle. There can be little doubt that this disease is microbic, and the microscopical examinations of Park^{59 Feb. 11} and others show that the microbes present are mainly cocci, which

appear to be the causal agents. Hence Park, from an etiological point of view, classifies follicular tonsillitis among the forms of pseudodiphtheria, though no fibrinous exudation caused by microbes may be present; but from a clinical stand-point we must consider this disease as ordinarily distinct from diphtheria or pseudodiphtheria. [The reason for this opinion is that, although follicular tonsillitis has apparently a microbic origin, and is perhaps contagious, so that two or more may often have it in the same family (and in one instance in my practice seven were affected by it), it does not produce the fibrinous exudation of pseudodiphtheria, and almost uniformly ends favorably. I have known only one death from it, which occurred from œdema glottidis or pseudomembranous laryngitis.]

The following observations and experiments of Koplik, of New York,⁵¹ should not, however, be overlooked. They show the intimate relation which may exist between follicular tonsillitis and diphtheria, as well as pseudodiphtheria. In certain cases the diphtheritic pseudomembrane was not present upon the fauces, and in others was slight. A small piece of mucous membrane was obtained upon a sterilized wire from the tonsils and applied to the surface of the Loeffler blood-serum in tubes. After twenty-four hours in the thermostat other serum tubes were prepared from these. A vigorous mixed growth resulted, and from these cultures, by repeating the process, single colonies were obtained. The Loeffler bacillus, the streptococcus, and Hoffmann's pseudobacillus were separated from each other, and the pathogenic character of the Klebs-Loeffler bacillus was demonstrated. Koplik arrives at the following conclusions:—

1. Virulent diphtheria may co-exist with follicular tonsillitis; so that it is proper to regard all specks upon the tonsils accompanied by inflammation as suspicious and likely to become diphtheritic.

2. The differentiation of scarlatinal angina with its necrosis, which often resembles a follicular exudate, from diphtheria or pseudodiphtheria, is very important and has been investigated by Sørensen and Booker.⁷⁶⁴ Oct., Nov., '92 The latter says that in severe scarlatinous angina, where death occurs in the active period of the disease, the tonsils appear as semi-purulent masses, and the exudation upon them seems to be more inlaid in the diseased tissue than upon its

surface. The microscope reveals necrosis of superficial parts of the fauces, and micrococci, single, in pairs and chains, in the dead tissue. Micrococci are also found in adjacent parts, even where few microscopical changes are apparent. In the tissue most diseased micrococci are found not only in superficial parts, but in the deep portions. If death occur at a later period, the microscope reveals destruction of superficial parts of the fauces in places where it was not observed during life, superficial necrosis of the mucous membrane and micrococci being found upon parts of the surface that seemed, to the unassisted eye, but little changed. Booker adds that in protracted severe cases the loss of tissue is greater, and, if the result be fatal, the necrosis and ulceration may extend along the Eustachian tube to the ear and outside the neck. The cervical and lymphatic glands may be involved in these severe cases, presenting a gelatinous appearance, hyperæmic in places, and containing abundant pus-cells. The necrotic tissue of the glands is filled with micrococci, as is also the surrounding infiltrated tissue. The destructive process may extend to and over the clavicle, and the microscope reveals the streptococcus and other cocci in the diseased tissue. The active agent in producing these destructive changes in scarlet fever seems to be the streptococcus, associated with other forms of cocci. These micrococci have not yet been differentiated from those which cause erysipelas, phlegmon, and pseudodiphtheria. The latter does indeed supervene upon the scarlatinous angina, when this is severe, and is regarded by physicians as a complication. The Klebs-Loeffler bacillus may also alight on the inflamed faucial or other mucous surface in scarlet fever, producing the complication of true diphtheria. It has been said, by some observers, that the fibrinous exudate occurring in scarlet fever, when the inflammation is most intense, is usually produced by the streptococcus; but if the pseudomembrane appear at a more advanced stage of scarlet fever, when the inflammation is subsiding, and a general aggravation of symptoms results, the cause of this change is the presence of the Klebs-Loeffler bacillus, and therefore true diphtheria has supervened.

3. The transudation of fibrin, forming a pellicle upon the faucial or other mucous surfaces, but not of microbial origin, must be diagnosticated from necrotic pseudomembranous inflammation,—that is, from diphtheria and pseudodiphtheria. In many

cases of this kind the cause is traumatism. Ordinarily, after the removal of the tonsils, fibrin exudes from the raw surface, forming a pellicle which, to the unassisted eye, cannot be distinguished from the diphtheritic exudate, but its origin is not microbic. It is produced by the escape of fibrin from the severed vessels, and disappears within a day or two. In the group which we are now considering should also be placed those cases of fibrinous exudation upon the surface caused by irritating agents, as strong ammonia, cantharides, and peroxide of hydrogen of many volumes. Any highly-irritating agent applied to one of the mucous surfaces causes inflammation, characterized by hyperæmia, infiltration, and swelling, and often the exudation of fibrin.

4. Pultaceous pharyngitis; confluent muguet. This usually occurs in exhausting diseases attended by faulty digestion and malnutrition. As the term "pultaceous" indicates, the inflammatory product is soft and friable, coming away in fragments, when touched by the brush or sponge, without bleeding or injury to the mucous membrane. Under the microscope it is found to consist of epithelial cells, often in fragments,—nuclei and nucleoli, but no fibrin. In certain cases, to which the term "cryptogamic" is properly applied, the oödium albicans is present. The appearance of the pultaceous product to the naked eye may closely resemble that in diphtheria, but its friable character, its epithelial nature, and the absence of fibrin, which the microscope reveals, render the diagnosis certain. In the New York Foundling Asylum, when diphtheria was prevailing, the tonsils of a newly-born infant were covered with a grayish-white pellicle believed to be diphtheritic, although the rarity of diphtheria in the newly born is well known. After its death the curator discovered a layer of soft, pultaceous material over the fauces without fibrin, and easily removed without injury to the mucous surface. The disease was pultaceous pharyngitis.

5. Herpetic pharyngitis. No one can mistake herpes of the fauces in its commencement for diphtheria; the minute vesicles of the former disease are so unlike the diphtheritic exudate that, when the vesicles, which are of short duration, have disappeared, small, rounded concretions distinct from each other occupy their place. If two or more of these coalesce, the appearance to the unassisted eye may closely resemble that of diphtheria or pseudo-

diphtheria, and a mistaken diagnosis may result. The simultaneous presence of herpes labialis affords presumptive evidence that the pharyngitis is herpetic, but not conclusive, since labial herpes is sometimes present in diphtheria. In this disease, also, it may be necessary to use the microscope in order to obtain a certain diagnosis.

Prognosis.—Tezénas du Moncel²¹¹ Sept. 17 communicated his observations on fifty cases convalescing from diphtheria. In all the cases of persistent coryzas consecutive to diphtheria, the nasal mucus contained Loeffler bacilli. He also observed cases in which the buccal cavity contained bacilli at the end of twenty-two, thirty-three, and even fifty-three days. Bard, in the discussion, also stated that his observations indicate the prolonged contagiousness of diphtheria, and that he had for a long time advocated the creation of an asylum for diphtheritic convalescents. Tobiesen⁵⁰ Oct. 31, '92 found the Loeffler bacillus upon the fauces of twenty-four out of forty-six patients convalescent from diphtheria and about to be discharged from the hospital. In these cases the disease had not been unusually severe, and the patients were discharged after the usual period of seclusion. From these investigations it seemed possible that one-half of them might have communicated diphtheria.

All authorities agree that true diphtheria is much more fatal than pseudodiphtheria. W. H. Park,⁵⁹ Feb. 11 between August 25th and December 25th, made cultures from the exudate from 104 cases of suspected diphtheria. In 73 of these the Loeffler bacilli were present, usually associated with streptococci, and often with other bacteria. In 31 the Loeffler bacilli were absent; in 26 of these the streptococci were the most numerous bacteria present. The staphylococcus pyogenes aureus was only irregularly present, and usually in small numbers. Of the 73 patients having true diphtheria, 19 died, a mortality of 26 per cent. Of the 31 cases of pseudodiphtheria, 1 died.

Of course, the prognosis depends largely on the type of the disease, and upon the treatment, which, we will see, is very varied.

Paralysis.—Donath, of Budapest,¹¹³ No. 41, '92 has published a case of diphtheritic hemiplegia. The patient was a boy of 8 years, whose parents were healthy peasants. The diphtheria continued fourteen days. On the third day of convalescence, when he was beginning

to leave the bed, he was seized in the night-time with hemiplegia, affecting the entire right side, including the face and causing loss of speech. For two weeks he could not utter a word, but made his wishes known by gestures. He was able to understand all that was said to him. The paralysis, so far as it affected the face, began to pass off in three weeks and the aphasia to improve in four weeks. When he began to speak it was only in a whisper; deglutition was not difficult during the paralysis. Two months later, when seen by Donath, there was no further improvement in speech, face, or limbs. There was still well-marked weakness of the right side of the body, affecting the face, arm, and leg. The speech was strong, but rather stammering and indistinct. There was some contracture in the right arm, and the corresponding leg was dragged in walking; slight general wasting of the affected limbs had occurred, but electrical reactions were normal, and there was no impairment of sensation. Donath adds that the myotatic irritability was increased in the affected limbs, the hemiplegia being evidently the result of a cerebral lesion, either thrombotic, embolic, or haemorrhagic. It cannot properly be considered a paralysis produced by the diphtheritic poison directly, for this comes on gradually and is bilateral.

H. H. Tooth² relates the following case: J. T., aged 5 years, sickened with sore throat December 2, 1891; temperature, 103.4° F. (39.7° C.); pulse, 140; respiration, 32; small diphtheritic patches on the tonsils; cervical glands slightly enlarged. December 3d, abundant nasal discharge, with pieces of pseudo-membrane; nostrils bleeding readily. December 11th, much albumen in the urine; other symptoms abating; knee-jerk present. December 14th, voice nasal and some dysphagia, but fluids not returning through the nose; a slight intonation of voice. December 27th, urine free from albumen, and patient allowed to sit up. January 5, 1892, voice distinctly nasal, patient becoming suddenly very deaf; palate immobile; able to walk with unsteady gait. In a few days he became entirely deaf, so as not to hear the loudest shout in his ears, and the knee-jerk completely disappeared. January 29th, could hear a watch at one inch from right ear; perosseous deafness absolute; swayed when eyes were shut, and could not walk toe and heel along a line without falling. February 23d, hearing in right ear normal, the watch being heard six

inches from the left ear; perosseous hearing normal on the right side, *nil* on the left side. February 26th, knee-jerks absent. In March the patient left the hospital in good health, except that he was likely to fall in walking on a line. In August he was slightly deaf and unsteady on his legs, and his speech not fully restored.

The deafness was too complete to be due to obstruction of the Eustachian tube by the pseudomembrane, and, as it occurred at the same time as the paralysis of the palate and the staggering gait, it is difficult to avoid the conclusion that it was caused by a lesion of the auditory nerve or auditory centre, of the same kind as in ordinary diphtheritic paralysis. If this supposition be true, it was an unusual instance of a sensory nerve being affected by the diphtheritic poison. The theory of an affection of the nerve-centre is more probable.

Another point of interest, according to Tooth, was the re-appearance of the knee-jerk. He states that it is usually supposed to re-appear in some weeks after the paralysis has disappeared, but he has seen cases in which it has not re-appeared for months or even years, and he is inclined to think that there are cases in which it never returns. Goumy²⁴³ states that in an epidemic of diphtheria in a cavalry regiment affecting 41 persons, with 3 deaths, diphtheritic paralysis occurred in 15 cases, or, excluding the 3 cases which died, in 39 per cent. In 5 cases there was diphtheria of cutaneous wounds, and all suffered from paralysis. One of them had at first diplopia and amblyopia, followed by weakness of the lower limbs sufficiently severe to prevent him from walking or even standing. The paralysis in most of the 15 cases was first noticed, as a rule, at the beginning of convalescence, and the soft palate was the part first attacked. Paraplegic symptoms were often accompanied by inco-ordination, and in some cases persisted a long time. In one case the weakness of the lower limbs was still present at the time in which the report was made, and seemed to be increasing. In addition to the 15 cases of paralysis, there were 2 cases of aphonia and 3 of temporary amblyopia.

T. F. Beveridge relates the following case of paralysis: Mr. T., aged 34 years, was attacked with diphtheria November 3, 1892. He had previous good health, and the initial symptoms were sore throat, headache, malaise, anorexia, and fever. He had the usual symptoms of diphtheria, but the temperature at no time exceeded

101° F. (38.3° C.). The patient could not swallow solid food from the beginning, and after three or four days fluids regurgitated through the nose. In the third week the speech was lost, from paralysis of the vocal organs, and did not return until the eighth week. Analysis of the urine at the height of the disease gave 50 per cent. of albumen. The paralysis gradually disappeared, and "at the end of the thirteenth week tenderness and sensation in extremities began to show improvement, and everything was favorable. Patient and family were cheerful"; but on the evening of February 10th he had a sinking spell, attended by numbness, profuse perspiration, and cyanosis. In the night of the 12th he had another sinking spell, and brandy, strychnia, quinine, and the most concentrated and nutritious diet were given, but the choking sensation continued, and death occurred.

P. Seifert ⁷⁵_{Feb. 15} relates two cases of cerebral hemiplegia following diphtheria. In both cases the onset of the paralysis was sudden, and the hemiplegia was complete, including the face, and was accompanied by aphasia. The author regards the first case as probably embolismal. In the second case, inasmuch as the heart-sounds were normal, he is led to believe that the cause of the paralysis was cerebral haemorrhage. The case is related ⁸_{No. 17-24}: A girl, 13 years old, died suddenly ten days after an attack of diphtheria. A microscopic examination of the heart showed partial fatty degeneration of the muscular fibres. Pathological degenerations were also found in the superior laryngeal, cardiac, phrenic, and splanchnic nerves. The author has observed sudden death in ten cases during convalescence from grave diphtheria. In all of them careful examination revealed the existence of dilatation of the heart some days before the event. Moreover, vomiting and disagreeable sensations in the cardiac regions were also observed in all during the last days. But auscultation does not give sure results. As regards the pulse, a simple arrhythmia does not involve great danger. It is observed in many convalescents from infectious diseases, but sometimes it is an unfavorable prognostic sign. Great frequency without fever is also a bad sign, and especially a pulse of 40 or fewer beats. The liver is always enlarged in post-diphtheritic collapse, and the phosphates in the urine are increased. Some attacks of syncope usually precede the fatal collapse. The treatment consists of rest in bed, good diet, camphor, strychnia, cataplasms, etc.

Prophylaxis.—The most effectual method of preventing diphtheria has been much discussed during the last few years, and efficient prophylactic measures have been recommended by prominent physicians of large experience. But during 1893 little additional information has been imparted. If diphtheria is suspected or ascertained, the physician should, before entering the sick room, remove his coat and vest, and cover his body, neck, and extremities with a blouse, as Grancher recommends, or a sheet fastened around his neck and body. It is necessary, at the first visit, to examine the fauces, in order to make the diagnosis, and at subsequent visits, in order to witness the progress of the disease. Most physicians sit in front of the patient, and in depressing the tongue a cough is usually excited, so that particles of pus or of pseudomembrane, if it be present, are likely to be ejected upon the face, beard, neck, or chest of the physician. Not long since a New York physician, in examining the fauces of a diphtheritic case, was conscious that a particle of some kind had lodged in his beard, but, his attention being diverted to other matters, he forgot to bathe his face and beard with a disinfectant, and returned home. His child of 3 years came to him, and, after the usual incubative period, sickened with a fatal form of the disease. It is not difficult to examine the fauces of a child standing by his side or behind him. It has been proposed also to examine the fauces through a pane of glass set in a convenient frame, which would allow a good view and intercept any ejected particles of muco-pus or pseudomembrane.

When the physician has completed his examination, and is about leaving the family, he should bathe his head, face, beard, and hands in an antiseptic lotion, as one of corrosive sublimate or carbolic acid. All physicians, so far as I have observed, who have written upon this subject, properly recommend the removal of all articles not required for the comfort of the patient, as the carpet, curtains, pictures, and decorations, and the exclusion from the sick-room of all persons except the physician and those who nurse the patient. They also recommend the removal from the house, or at least from the room or rooms communicating with the patient, of all members of the family not required. They should first be bathed with an antiseptic lotion, their fauces and nostrils sprayed with a germicide of some kind, and their wearing-apparel changed.

To advise and enforce such prophylactic measures is the manifest duty of the attending physician. We have elsewhere related in the ANNUAL how preventive rules recommended by experienced physicians and enforced by health boards have diminished the prevalence of diphtheria.

Beverley Robinson, of New York,^{Aug. 6} states that Roux and Yersin found the bacillus of diphtheria upon the faecal surface of those who had suffered from this disease as long as five weeks after the disappearance of the membrane. It is therefore probable that many patients dismissed from treatment, even if their surfaces have been bathed with a disinfectant and their apparel be new, may communicate the disease. Without personal disinfection the danger of infecting others is very great. Robinson also remarks that convalescents should use disinfectant gargles for a considerable period. [In one case that came under my observation, a boy with malignant and fatal diphtheria apparently contracted it by embracing a playmate who was in the street for the first time after an attack of diphtheria.] Robinson properly calls attention to the fact that walking cases so frequently communicate diphtheria, and to the fact that dress-makers, washerwomen, tailors, etc., frequently propagate the disease by clothing sent to healthy families. He also emphasizes the fact that not only children having this disease in its mildest form, attending schools, dispensaries, physicians' offices, and other places where children congregate, are very liable to communicate the diphtheritic bacillus, but physicians, without proper precautions, are also liable to propagate it. He alludes to the good results obtained in the ward for doubtful cases in the Trousseau Hospital of Paris, and in the Willard Parker Hospital of New York, by requiring all who visit the infected wards to wear blouses. He directs attention to the good results obtained by the constant employment of a disinfectant vapor, as eucalyptus, turpentine, carbolic acid, creasote, or tar. Either of these agents is added to water in a convenient vessel, and is constantly simmering by a moderate heat underneath. Robinson writes favorably of the following combination of antiseptics, employed in the New York Foundling Asylum for the purpose of disinfecting the air of the sick-room and preventing the propagation of the diphtheritic germs: Aidi carbolicæ, ol. eucalypti, $\text{â} \text{â}$ 1 ounce (31 grammes); terebinthinæ, 8 ounces (248 grammes). Misce. Two tablespoonfuls are added

to 2 quarts (litres) of water in a broad pan and maintained at a simmering heat. He recommends the substitution of creasote for carbolic acid for continuous inhalation, as being less liable to produce injurious or poisonous symptoms. He insists strongly on the following prophylactic measures: Mildly detergent and antiseptic gargles, such as diluted carbolic acid, boracic acid and water, thymol, menthol, wintergreen, or bichloride of mercury (1 to 10,000), which should be frequently employed by all persons exposed to diphtheria, as the nurse, physician, and the patient himself.

[Not only should the mouth and throat, but also the nostrils, be sprayed or washed by gargling with such a lotion. It is my practice to recommend for this purpose Squibb's 2-volume peroxide of hydrogen, one teaspoonful mixed at the time of use with one teaspoonful of the following to render it neutral: Aquæ calcis, 2 ounces (62 grammes), containing 10 grains (0.65 gramme) of sodium bicarbonate, or one of Carl Seiler's tablets dissolved in 2 ounces (62 grammes) of water.]

Robinson agrees with others who have written upon this subject that "a throat inspection should be made daily of all scholars in our public schools, of all children in our homes," during an epidemic of diphtheria. "Of course, this obligation becomes still more urgent whenever a child or adult, no matter where found or in what capacity, complains of symptoms of general malaise, allied or not with local symptoms or signs of implication of the throat in acute disease."

Treatment.—Peaucellier (quoted by another author) advises that the patient with diphtheria respire a moist atmosphere charged with the vapor of walnut, thymol, or other antiseptic, that the temperature of the room be maintained at 15° to 16° C. (59° to 61° F.), and constantly aerated from a window. He also recommends oxygen inhalation every two hours.

Kasem Beck³¹⁹ used aqueous solutions of methylene blue (1 to 9) in fourteen cases. The application was made two or three times daily by means of a swab, the membranes rapidly showing saturation by the coloring agent. The success, which was decided, was attributed by the author both to the local and constitutional action of the drug. In addition, he administered minute doses of pilocarpine, in order to assist the separation of the membranous exudate (?). The pyrexia and œdema subsided; no

local irritation was produced; and no unpleasant symptoms resulted, though the absorption of the drug was shown by its presence in the urine. All the patients thus treated recovered, although slight forms of paralysis occurred in three. [The danger of producing fatal bronchorrhœa by even moderate doses of pilocarpine have thus far prevented its common use in America.]

M. Newmann, of San Francisco,¹⁸⁶ in the beginning of diphtheria, administers six $\frac{1}{6}$ -grain (0.01 gramme) granules of calomel, followed in one hour by a tablespoonful of Seidlitz salts, and continues giving the Seidlitz, one teaspoonful in milk, three times daily. I. W. Grall⁸⁵ recommends "the free use of heroic doses of calomel" in the treatment of diphtheria.

[Calomel is one of the oldest remedies in the treatment of diphtheria, as of many other diseases; but it has fallen into disuse to a great extent on account of its depressing effects and the gingivitis and stomatitis which it occasionally produces, although less frequently in children than in adults. Of late its use, by sublimation and inhalation of its vapor, has attracted considerable attention in the United States, in the treatment of laryngeal diphtheria, as stated elsewhere. The observations of its effects, when thus employed, have established the belief among many good observers that it is the most efficient medicinal agent in the treatment of the laryngeal form. Cases have occurred, in my own practice and that of many others, which have apparently been rescued from impending death by the use of calomel sublimation, the increasing laryngeal obstruction being sufficient to justify an unfavorable prognosis. Moreover, there can be little doubt that its judicious employment in connection with intubation or tracheotomy increases the percentage of recoveries after this operation. In the large Foundling Asylum of New York the effects of the sublimation of calomel in tents occupied by patients with laryngeal diphtheria have been more frequently observed than in any institution in America. The technique and results are stated more fully under the head of "Croup."]

Sublimated calomel is a powerful remedy, as has been shown in the Foundling Asylum by the salivation of sisters and nurses outside of the tent. Recently, a New York physician, treating a case of severe pseudomembranous laryngitis in a family, by sublimation, employed it almost continuously from eight to twelve

hours, with his head most of the time within the tent. He had the satisfaction of seeing pieces of the pseudomembrane expectorated and the dyspnoea permanently relieved, without resorting to surgical methods, but with the result of severe salivation in himself, which continued more than a month. It is evident that so powerful a remedy should be used with caution, and only when a clear necessity demands its employment, but I have not observed any ill effects in the children who were thus treated. The result with them has apparently been very beneficial in some instances. The question is suggested whether one, two, or more cautious fumigations with calomel may not be useful in pharyngeal or nasal diphtheria.]

P. A. Fontaine¹⁸⁶_{Mar.} recommends two to four $\frac{1}{6}$ -grain (0.01 grammie) granules of the sulphide of calcium every fifteen minutes, until the breath, skin, and faeces emit the odor of sulphurated hydrogen. Fontaine believes that it paralyzes or kills the specific microbe of diphtheria.

Lescure⁶⁷_{p.214, 22} states that the indications are to destroy the false membranes, so as to stop the development of bacilli, and to combat the effects produced in the economy by the introduction of the toxins. To meet the first indication he applies the following solution of chromic acid, with a camel-hair pencil. Care is taken to remove from the pencil any excess of the acid, which is a powerful escharotic, so that its application be confined to the pseudomembrane: Rx Acidi chromici, 2 grammes (31 grains); aquæ destillatae, 5 grammes ($1\frac{1}{2}$ drachms). Misce. Lescure, after the application of the chromic acid, applies over the pseudomembrane the following solution of tannic acid: Rx Acidi tannici, 2 grammes (31 grains); glycerini, 5 grammes ($1\frac{1}{2}$ drachms). To be applied with the camel-hair pencil. He administers the following internally: Rx Tinct. eucalypti, 3 to 10 grammes ($\frac{3}{4}$ to $2\frac{1}{2}$ drachms); mucil. acaciae, 90 grammes (3 ounces); syr. aurantii, 30 grammes (1 ounce). To be taken in tablespoonful doses in twenty-four hours (8 doses).

Escherich⁸_{Nos. 7, 8, 9, 10} discusses facts furnished by bacteriological investigation, showing that the most successful medicinal treatment of diphtheria is local, the following being most successful in his practice: First, spraying an antiseptic lotion directly on the inflamed surface; and, secondly, swabbing with a corrosive-subli-

mate solution. The first is the most efficacious. It presents the following advantages: (a) The quantity of the solution used by the spray is not large, and there is less danger, therefore, of a poisonous effect. (b) The solution reaches the affected part in the most active and certain manner, the medicine being so spread as to reach all parts of the affected surface. The instrument used by Escherich is the hand- and not the steam- atomizer. He prefers, for spraying the fauces, and I presume the nares, corrosive sublimate, 1 to 1000. At the same time the mouth is washed with a milder antiseptic (boracic acid or thymol). In certain cases, in which it is impossible to obtain a good view of the fauces, Escherich applies the sublimate solution by means of a soft, fine, and small sponge, held in a holder and pressed with a twisting motion against the affected surface. The application is made from three to eight times at one or two daily sittings. The sponges should be cleaned by soaking in sublimate solution, or in boiling water, and then squeezed out and dried. By their disinfection in this manner they may be used several times.

M. G. Tull⁷⁶⁰ _{May 20} states that he has been successful in treating diphtheria by Rennert's method,—that is, by applying to the fauces a 1-to-500 tartaric-acid corrosive-sublimate solution. He employs Mulford's tablets, consisting of 3.85 grains (0.25 grammes) of corrosive sublimate, and 18.25 grains (1.17 grammes) of tartaric acid. One tablet, containing this quantity of the medicines, is added to 4 ounces (124 grammes) of water, producing a solution of 1 part of corrosive sublimate to 500 of water. The throat is thoroughly swabbed with this every six hours.

Jules Simon^{212 17} _{Apr. 3 June 3} maintains that good results are obtained not only by the efficiency of the remedy employed, but by the fidelity with which it is used. Successful treatment results not only from the selection of proper remedies, but by their prompt and judicious use. He advocates the employment of two forceps, with their points surrounded by absorbent cotton,—one for cleansing the fauces, and the other for applying the local remedy. After each application the cotton is thrown away and the forceps disinfected in boiling water. Applications should be made hourly through the day and every two hours at night. As to the liquid used, he recommends, in mild cases, lemon-juice, a 4-per-cent. solution of citric acid, or the following: Rx Acidi salicylici, 1

gramme (15½ grains); infus. eucalypti, glycerini, &c. 50 grammes (1½ ounces). To this sufficient alcohol is added to make a thorough solution. If the pseudomembrane be thick and resistant, one-half of the glycerin in the above formula can be replaced by the solution of the perchloride of iron (French Phar.). Simon also recommends, as supplementary treatment, nasal irrigation with boric acid in water, or weak aqueous solutions of chloride of iron. For internal treatment he employs highly-tonic and stimulating treatment by alcoholic preparations, iron, etc. The iron should not be given from a metallic spoon.

E. Hübner and N. Rosenthal ¹¹⁶_{Dec., '92} extol the use of chloride of iron in diphtheria, by the method recommended by Rehm. Hübner treated 52 cases with it, losing 2, although 6 patients that recovered had the disease with such severity that he could not have hoped to save them with any of the remedies heretofore prescribed. He had the throat painted twice daily, and in severe cases three times, with equal parts of the iron and diluent to one part of the iron and five of the diluent. He also sprayed the throat with lime-water, allowed pellets of ice in the mouth and ice around the neck. Rosenthal tabulates 79 cases of genuine diphtheria treated by the chloride of iron, with only 7 deaths. The patients came under treatment early and remained until the disease was over.

Flahaut ²⁰³_{No. 3; Apr., '92} gives particulars of an epidemic in 1891-92, in the course of which 70 persons were attacked. He divides the cases into two series: (1) 30 cases, between April 15, 1891, and May 5, 1892, treated by the methods in common use, with the result that 9 died and 21 recovered; (2) 40 cases, between May 5 and June 15, 1892, treated with petroleum applications, with no deaths. Every hour, or two hours, the throat should be painted with a brush steeped in crude petroleum, the brush being lightly shaken before using, so that no petroleum may trickle into the respiratory passages. The applications cause no pain, even when the mucous surface is raw and bleeding, and they are immediately followed by separation of the membranes, which seem to be dissolved by the petroleum. A fortnight after the general adoption of this method the epidemic ceased.

Larcher ¹¹⁸_{Sep., '92} states that since 1886, of 42 patients treated by petroleum, two died. One of these was very young, and arrived

at an advanced period of the malady; the other was a child of 6 years, who had a very extended diphtheritic inflammation, and resisted treatment to such an extent that it could be only partially employed. Of the 40 who recovered, the disease was well characterized, and had, in the average, advanced to the second or third day. The treatment, which consists in swabbing or gargling every two hours, rapidly produces softening and detachment of the pseudomembranes. They are sometimes reproduced, but thinner and of less extent, so that healthy mucous membrane may be observed between; and soon, by continuing the treatment, the pseudo-membrane is not reproduced. In 7 of the 42 cases palatal paralysis occurred. Larcher believes that he is justified in announcing: 1. That petroleum may effect the cure of diphtheria. 2. That its employment is without inconvenience. 3. That it can be employed concurrently with other remedies. 4. That the duration of treatment varies from eight to eighteen days. 5. That in the 42 cases no instance of its propagation to others occurred. Its communicability seems to be lost or diminished by the petroleum treatment.

Behrens⁶⁹ _{Apr. 27, May 4} conducted experiments in order to ascertain whether the serum of sheep that are known to be immune as regards diphtheria can be utilized in preventing or curing diphtheria in the human species. His investigations, in his opinion, appear to show that this serum has a specific action against diphtheria, and that injected hypodermatically it produces no ill effects. He endeavored to prepare a serum from the sheep of such power that it could be used for medicinal purposes, so that a small quantity might prevent or counteract the effects of the specific bacillus. In conjunction with Kossel, he employed the serum in thirty children, with the result that six succumbed to diphtheria, or 20 per cent.; the deaths under other modes of treatment being 40 to 50 per cent. Of eleven patients treated by serum, nine recovered. Klemensiewicz and Escherich⁵⁰ _{B. 12.1.5.6} believe that they have rendered guinea-pigs immune as regards diphtheria, by hypodermatic injections of the serum of convalescent patients.

Wilhelmy⁶⁹ _{No. 8, p. 99, 92} brushes the throat with a 20-per-cent. solution of chloride of zinc. This penetrates the infected parts sufficiently, and does not penetrate those parts which are covered with epithelium. It is necessary to employ curved forceps, the extremity of which is surrounded by a pledget of cotton soaked in the solu-

tion. In consequence of the curve of the forceps it is possible to make the application to the posterior surface of the tonsils and uvula, and of part of the naso-pharynx. It is necessary to depress the tongue with a depressor in making the application. The pain is considerable, but does not continue more than twenty minutes, and is effectually relieved by ice-water or pieces of ice. Notwithstanding the cauterization, no œdema occurs. After the cauterization, Wichelung prescribes a gargle of 300 parts of lime-water, 30 parts of glycerin, and 5 drops of the essence of mint. Wine, the pulp of meat, and tonics are given, and in three to six days the eschar and the surface underneath seem healthy.

Sir B. W. Richardson ²² _{Nov. 9, '92} states that in 1857, when he began experiments with the peroxide of hydrogen, it was a rare chemical curiosity, ²⁰⁸⁷ _{'60} never previously used in medicine, and he had, therefore, no guide from former experience. He first employed it in the strength of four and five volumes, and gradually increased the volumes to twenty and thirty. He soon learned that the action of oxygen from the higher volumes, released in the presence of pus and other substances, was so great and rapid that the effect was practically explosive, and after many trials he came to the conclusion that the 10-volume strength was the best for ordinary use.

As frequently happens, when an active and efficient remedial agent is discovered, its efficiency and full value were not appreciated. The peroxide was indeed seldom employed until it was brought prominently and favorably to the notice of the profession by E. R. Squibb, in 1889, ²¹³⁶ _{Feb. 5, '89} who said: "It is perhaps the most powerful of all disinfectants and antiseptics, acting both chemically and mechanically upon all secretions and excretions, so as to change their character and reactions instantly."

The new medicine began to be used in surgical and in those medical cases which required local treatment, and the laudatory opinion of Squibb was in many instances justified by the result. But the pharmaceutical peroxide was soon found to be too irritating for use in the various inflammations of the nares and fauces in children, so that even a 15-volume solution, diluted with two or more times its bulk of water, applied by spray or otherwise, increased the inflammatory hyperæmia of the nasal, buccal, and faucial surfaces, sometimes causing, in addition to the increase of inflammation, a pellicular exudation of fibrin, as when strong

ammonia, having a caustic action, is used. Distinguished physicians, whose opinions influence practice in both hemispheres, related cases²¹³⁷ _{May, '92} showing the pernicious effects of the peroxide, applied by spray or otherwise to the delicate and tender nasal, buccal, or faucial surface of the child, in catarrhal or pseudomembranous inflammation, so as to increase the area and severity of the inflammation, and sometimes form the thin, fibrinous exudate to which I have alluded. I might mention similar results in my own practice and that of others, the induced catarrhal and pellicular inflammation abating when the use of the peroxide was discontinued. The irritating action appears to be due to the sulphuric and phosphoric acids used in the composition of the peroxide. It was ascertained, by the use of litmus-paper, that 1 ounce (31 grammes) of Squibb's 11-volume peroxide required the addition of 2½ grains (0.16 gramme) of sodium bicarbonate to produce its neutralization. In order to obtain information in regard to the effect of neutralizing the peroxide upon the efficiency of this agent, and thus preventing any irritating effect from its acidity, Squibb was written to, who replied as follows⁵¹ _{Aug.}: "It is necessary that solutions of hydrogen dioxide should be slightly acid when they are to be kept for even a very few hours. If neutral or alkaline they will decompose at the rate of some two or three volumes a day, and faster the warmer the weather, and the stronger solutions would soon burst any ordinary bottles." Squibb states that the neutralization of the peroxide by such alkaline agent as the sodium bicarbonate does not diminish its efficiency, "provided this be done very near to the time of using; then, by ordering the peroxide a little stronger than you want to compensate the loss by decomposition, you could get a fairly uniform solution for, say, six or eight hours after the sodium has been added, provided the bottle be kept in a cold, dark place."

The irritating action of the peroxide, due to its hyperacidity, may therefore be prevented by adding to it an alkali, as the sodium bicarbonate, immediately before its use, so as to render it neutral, or preferably alkaline when used. By so doing its germicide and antiseptic properties do not appear to be diminished.

Thus, during the past two years, very satisfactory, and for the most part successful, results have been obtained, in the New York Foundling Asylum, in the treatment of pseudomembranous inflam-

mations by the following prescriptions: Rx Squibb's (11-vol.) peroxide of hydrogen, 2 ounces (62 grammes). Rx Sodii bicarbonat., 12 grains (0.8 grainme); aquae calcis, 2 ounces (62 grammes). Misce. One teaspoonful of each is mixed in the bottle of the hand-atomizer immediately before use. The mixture is sprayed hourly over the faacial and perhaps nasal surfaces. For young infants one teaspoonful of water may be added to the mixture immediately before spraying.

The New York Foundling Hospital, the largest institution of the kind in America, receives more than 1000 newborn infants annually, mostly foundlings from the city, but some of them born in the Maternity Service connected with the Hospital. It has been found necessary to farm out a considerable number of the foundlings, chiefly in tenement-house families, and when they are seriously sick they are returned to the hospital. Hence many young children with diphtheria, frequently of a severe form and in an advanced stage, are returned. The following are the recent statistics relating to diphtheria in this institution. ("Biannual Reports of the New York Foundling Hospital") :—

	Entire Number.	Died.
1890,	71	36
1891,	67	35
1892,	60	11
1893,	123	16

It is seen that in 1892 and '93 the proportionate number of deaths was greatly diminished as compared with that in the two preceding years. It is not improbable that the better result was due, in part, to a change in type, but it is probable that it was due also to improved treatment. In 1892 and since the peroxide of hydrogen has been employed, and in 1892 and the first part of 1893 its use was followed by insufflation of the following: Rx Trypsin, sodii bicarbonat., $\text{a}\bar{\text{a}} \frac{1}{2}$ ounce (15 grammes); sulphur. subl., 2 drachms (8 grammes).

Subsequently, until the present time, the papoid has been employed in place of this powder.

Papoid, also designated papayotin and vegetable pepsin, is a digestive ferment obtained from the fruit of the South American melon-tree. Its digestive power has been fully investigated by R. H. Chittenden, of the Sheffield Scientific School. ²¹³⁸ _{V.4, '92} He states

that it "has the power of digesting all forms of proteid or albuminous matter" in neutral acid and alkaline media. In his opinion, the commercial papoid is "a mixture of vegetable globulin, albumoses, and peptone, with which is associated the ferment." He details his experiments on raw blood-fibrin, which "comes nearest, chemically, to the so-called pseudomembranes, such as are found in diphtheria," etc. The following facts, ascertained by him, are important in reference to the use of this agent in pseudomembranous inflammations, whether seated upon the faucial or nasal surfaces or elsewhere:—

Its "best and characteristic action is seen only when a small volume of fluid is present. Its proteolytic action is increased by the presence of an alkaline medium, in some cases greatly increased by the presence of 2 to 4 per cent. of sodium bicarbonate; the highest digestive power is obtained in the presence of sodium bicarbonate. We cannot affirm that any alkaline reacting-fluid will give the same increase in digestive action as sodium bicarbonate."

Since the 1st of August, 1893, the treatment of diphtheria and pseudodiphtheria in the New York Foundling Asylum has been as follows: The peroxide of hydrogen, rendered alkaline at the time of use by admixture with the solution of sodium bicarbonate, as stated above, is sprayed every hour or second hour, from a simple hand-atomizer, over the fauces and nares, and immediately afterward the papoid is insufflated by the proper instrument. The treatment has in no instance been in the least painful. The cases thus treated have been tabulated by the house physicians, B. Van D. Hedges and R. S. Adams. Forty-five cases recovered, and in 43 of these the average duration of the pseudomembrane was 7.4 days. In the remaining favorable cases the duration of the exudate was not recorded. In all these 45 favorable cases the Klebs-Loeffler bacillus was obtained from cultures made by Park.

During the same months in which these recoveries occurred, thirteen patients perished, in whom cultures also revealed the presence of the Klebs-Loeffler bacillus. But the tabulated statistics relating to these cases (see next page) show that they were almost necessarily fatal. In fact, most of these patients, in the presence of scarlet fever, broncho-pneumonia, and nephritis, received only partial treatment by the peroxide and papoid. Perhaps

a still better result might be achieved by combining the trypsin powder with the papoid.

TABLE OF FATAL CASES.

Name.	Age.	Location of Membrane.	Highest Temperature.	Complications.
1. John L. . . .	11 months.	Entire pharynx.	105° F. (40.0° C.).	Bad croup. Intubation-tube removed on seventh day; six days later he developed double broncho-pneumonia; died in forty-eight hours. Autopsy showed broncho-pneumonia and thickening of vocal cords; no membrane in trachea.
2. Joseph C. . . .	4 years.	Entire pharynx.	105° F. (40.6° C.).	Malignant scarlet fever; croup. Intubation, with relief of dyspnoea. Death following day. Autopsy: Extensive broncho-pneumonia and parenchymatous nephritis; cords thickened.
3. Ethel N. . . .	1 year, 9 mos.	Both tonsils and post pharynx.	. . . . .	Died two hours after admission, before any treatment had been given. Autopsy: Small amount of membrane in larynx.
4. Lewis A. . . .	3 yrs., 4 mos.	Both tonsils and post pharynx.	104° F. (40° C.).	Marked croup; intubation; malignant scarlatina; parenchymatous nephritis. Autopsy: Extensive broncho-pneumonia; membrane extending to bifurcation.
5. Jennie L. . . .	2 yrs., 6 mos.	Post pharynx.	105° F. (40.6° C.).	Malignant scarlet fever; diphtheritic conjunctivitis; broncho-pneumonia. No autopsy.
6. Celestine D. . .	3 years.	Both tonsils and soft palate.	103° F. (39.5° C.).	Severe croup; intubation. Autopsy: Extensive beginning broncho-pneumonia; some membrane in larger bronchi.
7. Fabyan M. . . .	3 years.	No membrane visible.	105° F. (40.6° C.).	Very severe croup; intubation. Autopsy: Very extensive membrane in trachea, larger and smaller bronchi.
8. Joseph L. . . .	3 yrs., 6 mos.	Entire pharynx.	105.5° F. (40.8° C.).	Severe croup from beginning. Intubation for relief of dyspnoea. Autopsy: Extensive beginning broncho-pneumonia; membrane in trachea, larger and smaller bronchi.
9. Adelia M. . . .	1 year.	Right tonsil.	106.4° F. (41.3° C.).	Severe croup; measles; varicella; broncho-pneumonia at base of both lungs.
10. Mary Brett . . .	7 months.	Right tonsil and air-passages, causing dangerous croupal stenosis.	105° F. (40.6° C.).	Died of diphtheritic croup and double broncho-pneumonia; was intubated.
11. William Smith	8 months.	Both nares, tonsils, oesophagus, and larynx.	106° F. (41.1° C.).	Right broncho-pneumonia; immense glandular enlargement and suppuration; sepsis.
12. Jenny B. . . .	9 months.	Nares.	107.2° F. (41.7° C.).	Had scarlet fever, nephritis, and broncho-pneumonia.
13. Mary D. . . .	7 months.	Nares, both tonsils, larynx, producing marked dyspnoea.	105.8° F. (41° C.).	Had broncho-pneumonia and acute nephritis.

In many of the cases, favorable and unfavorable, embraced in the above statistics, the tincture of the chloride of iron, and

the syrup of pine-apple, which contains a large amount of malic acid, were also administered in the following formula: R. Tinct. ferri chloridi, 2 drachms (8 grammes); syr. ananassæ sativæ, 4 ounces (124 grammes). Misce. One teaspoonful of this acid mixture twenty minutes before the alkaline spray.

After considering carefully the statistics of other modes of treatment recommended by distinguished American and European observers, it seems to me that that by the peroxide of hydrogen and papoid furnishes very favorable statistics and advantages which commend it to further use. It is not painful or poisonous, like corrosive sublimate, while it is very penetrating, destroying the bacillus and its toxins, and destroying and removing all the muco-pus with which it comes in contact, so that the pseudomembrane is freely exposed to the action of the papoid. Whatever the treatment, all observers agree that alcoholic stimulants freely given, the most concentrated nutriment, and fresh air without exposure to currents, are needed.

J. L. S.

CROUP.

Etiology.—W. D. Booker,⁵¹ in an interesting paper read before the American Pediatric Society on May 24th, remarks that Henoch believes in a true inflammatory croup. On the other hand, it is well known that true diphtheritic inflammation, with the formation of pseudomembrane, may occur without diphtheritic inflammation of any other part. In the case of a child of 3 years no pseudomembrane was observed, except upon the air-passages, upon and below the epiglottis. Cultures from the pseudomembrane, taken from the bronchial tubes, larynx, trachea, spleen, and submaxillary glands, "give almost pure cultures of the Loeffler bacillus. On the first and second days the Loeffler bacillus appeared, but on the third day colonies of streptococci appeared. Cultures of the blood and from the apex of the lungs gave chiefly streptococci, but also some diphtheritic bacilli." E. Fraenkel reports four similar cases, and concludes that the so-called idiopathic croup is identical with the croup so frequently accompanying true pharyngeal diphtheria.

Treatment.—McNaughton and Maddren¹⁵⁷ have collected and published a very valuable mass of statistics regarding the different methods of treatment in laryngeal stenosis; they wrote

to nearly four hundred physicians in various parts of the country, who were supposed to have had considerable experience in the treatment of true croup. Answers were received from about one-half, and the results obtained are tabulated as follows:—

STATISTICS OF THE TREATMENT OF TRUE CROUP BY TRACHEOTOMY, BY INTUBATION,
AND BY CALOMEL SUBLIMATION. COMPILED BY DRs. GEORGE MCNAUGHTON
AND WILLIAM MADDREN.

NAME.	RESIDENCE.	Tracheotomies,		Tracheotomies after Intubation.		Intubations,		Intubations after Tracheotomy.		Calomel Sublimations.		Tracheotomies or Intubations after Sublimation.		Recoveries.
		Recoveries.	Deaths.	Recoveries.	Deaths.	Recoveries.	Deaths.	Recoveries.	Deaths.	Recoveries.	Deaths.	Recoveries.	Deaths.	
D. P. Allen . . .	Cleveland, Ohio . . .	.	.	.	.	11	2	.	.	.	.	.	.	.
H. A. C. Anderson . . .	New York City . . .	.	.	.	.	11	4	.	.	.	.	.	.	.
J. A. Anderson . . .	San Francisco, Cal. . .	.	.	.	.	39	9	.	.	.	.	.	.	.
Benjamin Ayers . . .	Brooklyn, N. Y. . .	1	0	.	.	.	.	.	.	.	.	.	.	.
Francis Baldwin . . .	Brooklyn, N. Y. . .	4	1	.	.	.	.	.	.	.	.	.	.	.
I. H. Barber . . .	Brooklyn, N. Y. . .	8	2	.	.	.	.	.	.	.	.	.	.	.
E. H. Bartley . . .	Brooklyn, N. Y. . .	1	0	.	.	5	0	.	.	.	.	.	.	.
H. O. Bates ¹ . . .	Chicago, Ill. . .	5	1	2	0	23	11	.	.	.	.	.	.	.
W. P. Beach . . .	Brooklyn, N. Y. . .	6	5	.	.	.	.	.	.	.	.	.	.	.
G. D. Beasley . . .	Brooklyn, N. Y. . .	3	0	.	.	.	.	.	.	.	.	.	.	.
Carl Beck ² . . .	New York City . . .	68	17	6	3	29	7	.	.	.	.	.	.	.
H. O. Bender . . .	Brooklyn, N. Y. . .	2	0	2	0	38	10	.	.	.	.	.	.	.
S. H. Benton ³ . . .	Brooklyn, N. Y. . .	13	5	.	.	.	.	.	.	.	.	.	.	.
R. Berendsohn . . .	Brooklyn, N. Y. . .	.	.	.	.	.	.	.	.	.	.	.	.	.
H. W. Berg . . .	New York City . . .	.	.	.	.	17	4	.	.	.	.	.	.	.
J. C. Bierwirth . . .	Brooklyn, N. Y. . .	.	.	.	.	.	.	.	.	.	.	.	.	.
S. C. Blaisdell . . .	Brooklyn, N. Y. . .	9	6	.	.	.	.	.	.	.	.	.	.	.
J. Block ⁴ . . .	Kansas City, Mo. . .	8	0	.	.	8	1	.	.	.	.	.	.	.
H. Boenning . . .	Philadelphia, Pa. . .	.	.	.	.	3	1	.	.	.	.	.	.	.
J. B. Bogart . . .	Brooklyn, N. Y. . .	3	0	1	0	.	.	.	.	.	.	.	.	.
S. D. Boggs . . .	Brooklyn, N. Y. . .	.	.	.	.	3	0	.	.	.	.	.	.	.
H. J. Boldt . . .	New York City . . .	28	18	.	.	16	9	.	.	.	.	.	.	.
J. H. Bowen . . .	Brooklyn, N. Y. . .	.	.	.	.	.	.	.	.	.	.	.	.	.
G. E. Brewer . . .	New York City . . .	12	1	.	.	1	0	.	.	.	.	.	.	.
A. Brinkman ⁵ . . .	Brooklyn, N. Y. . .	5	2	.	.	.	.	.	.	.	.	.	.	.
A. Brothers . . .	New York City . . .	1	0	.	.	38	14	.	.	.	.	.	.	.
Dillon Brown ⁶ . . .	New York City . . .	11	0	4	0	545	171	1	0	.	.	.	.	.
Wm. Browning . . .	Brooklyn, N. Y. . .	.	.	.	.	.	.	.	.	.	.	.	.	.
A. Y. Brugman . . .	New York City . . .	.	.	.	.	18	7	.	.	.	.	.	.	.
E. F. Brush . . .	Mt. Vernon, N. Y. . .	.	.	.	.	20	1	.	.	.	.	.	.	.
H. A. Brunker . . .	Brooklyn, N. Y. . .	.	.	.	.	.	.	.	.	.	.	.	.	.
Bost. City Hosp. ⁷ . . .	Rep. by Lovett . . .	466	111	.	.	392	80	.	.	.	.	.	.	.
Augustine Caiffe ⁸ . . .	New York City . . .	30	8	.	.	148	42	.	.	.	.	.	.	.
C. P. Caldwell . . .	Chicago, Ill. . .	.	.	.	.	7	1	.	.	.	.	.	.	.
W. H. Carmalt . . .	New Haven, Ct. . .	6	1	.	.	5	0	.	.	.	.	.	.	.
W. L. Carr . . .	New York City . . .	.	.	.	.	5	1	.	.	.	.	.	.	.
A. G. Case . . .	Pittsburgh, Pa. . .	.	.	.	.	11	4	.	.	.	.	.	.	.
W. E. Casselberry . . .	Chicago, Ill. . .	6	2	3	1	15	3	.	.	.	.	.	.	.
John Chambers . . .	Indianapolis, Ind. . .	.	.	.	.	1	0	.	.	.	.	.	.	.
J. W. Chambers . . .	Baltimore, Md. . .	.	.	.	.	10	2	.	.	.	.	.	.	.
W. B. Chase ⁹ . . .	Brooklyn, N. Y. . .	.	.	.	.	.	.	.	.	.	.	.	.	.
W. Cheatham . . .	Louisville, Ky. . .	2	1	1	0	56	22	.	.	.	.	.	.	.
D. W. Cheever . . .	Boston, Mass. . .	55	14	.	.	4	3	.	.	.	.	.	.	.
B. G. Clark ¹⁰ . . .	New York City . . .	.	.	.	.	.	.	.	.	.	.	.	.	.

¹ Believes that more recoveries would have followed had intubation been performed earlier.

² Believes that some of his successful cases of intubation would have recovered without tube.

³ Objects strongly to intubation in membranous croup.

⁴ His best results from bichloride spray.

⁵ All the cases operated on were extremely grave and far advanced toward death.

⁶ Believes that calomel fumes loosen membrane; as in two cases sublimated a cast was thrown up and recovery followed.

⁷ Uses sublimation extensively, but had not time to look up statistics.

⁸ Includes 139 tracheotomies that were excluded from Dr. Lovett's report because they were the severest and most desperate cases. I did not know what else to do with them.

⁹ Considers sublimation a valuable measure, which should be used early, before dense membranes form.

¹⁰ In one case membrane was pushed down by tube, and instant death followed.

¹¹ One death was from uremia.

¹² The fatal case coughed up membrane with four branches.

STATISTICS OF THE TREATMENT OF TRUE CROUP BY TRACHEOTOMY, ETC.

(Continued.)

NAME.	RESIDENCE.	Tracheotomies.			Intubations.			Intubations after Tracheotomy.			Colonial Sublimation.			Tracheotomies or Intubations after Sublimation.		
		Recoveries.	Tracheotomies after Intubation.	Recoveries.	Intubations.	Recoveries.	Intubations after Tracheotomy.	Recoveries.	Colonial Sublimation.	Recoveries.	Tracheotomies or Intubations after Sublimation.	Recoveries.	Tracheotomies or Intubations after Sublimation.	Recoveries.		
J. L. Cleveland	Cincinnati, O.	4	0			31	6									
E. L. Cocks	New York City	4	12	1	0	47	12	6								
D. C. Cocks	New York City					12	6									
G. H. Cocks	New York City					14	4									
James Collins	Philadelphia, Pa.					9	3									
F. H. Colton	Brooklyn, N. Y.															
J. J. Conway	Brooklyn, N. Y.	4	0													
T. P. Corbally	Brooklyn, N. Y.	2	2													
J. Corbin ¹	Brooklyn, N. Y.															
J. O. D. Cullen	Richmond, Va.					1	0									
J. G. Curtis	Louth					1	1									
W. N. De Long ²	Brooklyn, N. Y.	8	1													
C. E. Denhard ³	New York City	34	15	3	1	27	13									
Charles Denison	Denver, Col.	1	1			30	10									
W. H. De Witt	Cincinnati, O.	2	1			15	7									
D'Heilly	Paris, France					11	2									
F. Donaldson, Jr.	Baltimore, Md.					1	0									
A. J. Power ⁴	Brooklyn, N. Y.	27	17													
N. A. Drake	Kansas City, Mo.					1	0									
J. H. Droke	Brooklyn, N. Y.	2	0			9	3									
W. F. Dudley	Brooklyn, N. Y.	2	0			2	1									
L. H. Dunning	Indianapolis, Ind.	4	0			14	4									
Joseph Eichberg	Cincinnati, O.					95	34									
Z. T. Emery	Brooklyn, N. Y.	1	0													
G. A. Evans	Brooklyn, N. Y.	2	0			16	0									
E. D. Ferguson	Troy, N. Y.					11	2									
J. W. Flynn	New York City	2	0													
G. R. Fowler	Brooklyn, N. Y.	54	12													
F. Forchheimer	Cincinnati, O.					5	2									
J. M. Fox	Philadelphia, Pa.					1	1									
S. E. Fuller ⁵	Brooklyn, N. Y.	6	3			4	0									
I. P. Furniss	Selma, Ala.					1	1									
J. D. Griffith	Kansas City, Mo.	32	8			36	8									
W. E. Griffiths	Brooklyn, N. Y.	2	1													
Wm. Hailes, Jr.	Albany, N. Y.	2	0	2	0	400	132									
Gordon R. Hall	Brooklyn, N. Y.															
I. H. Hance	Saranac Lake, N. Y.	1	0	1	0	6	1									
M. Hartwig ⁶	Buffalo, N. Y.	3	2			5	3									
J. B. Harvie	Troy, N. Y.	3	0			4	4									
M. P. Hatfield	Chicago, Ill.					8	0									
L. Haupt	New York City	3	0			3	1									
D. C. Hawley	Burlington, Vt.					2	0									
S. Hendrickson	Brooklyn, N. Y.	1	0													
J. V. Hennessy	Albany, N. Y.					30	9									
F. Henrotin	Chicago, Ill.	9	2	2	0	111	23									
C. C. Henry	Brooklyn, N. Y.															
F. W. Hinkle	Buffalo, N. Y.					1	0									
A. E. Hoardley	Chicago, Ill.	5	2	1	0	46	12									
J. F. Holmes	New York City					6	4									
L. E. Holt	New York City					10	2									
F. Hopkins (Stern)	New York City					6	6									
F. Huber	New York City					91	37									
P. D. Hughes	Kansas City, Kan.	1	0			9	4									
J. Hamrichouse	Hagerstown, Md.					5	1									
O. H. Hund	San Francisco, Cal.					3	1									
J. H. Hunt	Brooklyn, N. Y.	4	0			8	2									
A. S. Hunter ⁷	New York City	5	0			40	14									
N. S. Hunting	Quincy, Mass.			9	1											

¹ Two deaths from albuminuria two weeks after relief of laryngeal stenosis; one death from sepsis.² All the tracheotomies were performed as a last resort.³ Used bichloride of mercury in all cases.⁴ Always uses bichloride of mercury and chlorate of soda internally, combined with sublimation. Two of the cases operated on were only 22 months old, and both recovered.⁵ Prefers intubation for babies; tracheotomy after fourth year.⁶ Two tracheotomies for non-croupous troubles not included.⁷ Three intubations performed after pulmonary complications had appeared.

STATISTICS OF THE TREATMENT OF TRUE CROUP BY TRACHEOTOMY, ETC.
(Continued.)

NAME.	RESIDENCE.	Tracheotomies,				Intubations,				Calomel Sublimations,				Recoveries.
		Recoveries.		Tracheotomies after Intubation.	Recoveries.		Intubations.	Recoveries.		Intubations after Tracheotomy.	Recoveries.		Tracheotomies or Intubations after Sublimation.	
W. Hutchinson ¹	Brooklyn, N. Y.	.		.	.	.		.		.
J. W. Hyde	Brooklyn, N. Y.	3	1	.	.	.	25	6	.	.		8	5	
E. F. Ingals	Chicago, Ill.	.	.	.	.	.	10	2	.	.				
H. D. Ingraham	Buffalo, N. Y.	.		.	.	.	18	2	.	.				
H. F. Ivins	Philadelphia, Pa.	30	1	.	.	.	.	.	.	.
A. Jacobi ²	New York City	650	124	.	.	.	.	.	.	.
C. G. Jennings	Detroit, Mich.	50	23	7	0	46	9	.	.	.				
Charles Jewett ³	Brooklyn, N. Y.	8	1	.	.	.	.	.	.	.
F. A. Jewett	Brooklyn, N. Y.	12	0	.	.	.	.	.	.	.		10	6	
G. N. Jones	Gloucester, Mass.	.		.	.	.	1	0	.	.		2	2	
S. S. Jones ⁴	New York City	6	1	.	.	.	2	1	.	.				
M. S. Kakels	New York City	6	1	.	.	.	1	1	.	.		8	7	
J. A. Kene	Brooklyn, N. Y.	.		.	.	.	.	.	.	.		1	0	
J. C. Kennedy	Brooklyn, N. Y.	28	4	.	.	.	10	2	.	.		7	4	
J. S. King ⁵	Brooklyn, N. Y.	8	0	.	.	.	3	0	.	.				
W. H. Knap	Chicago, Ill.	.		.	.	.	3	2	.	.				
J. L. Kortright ⁶	Brooklyn, N. Y.	3	0	.	.	.	.	.	.	.		12	11	
G. R. Kuhn	Brooklyn, N. Y.	4	1	.	.	.	3	1	.	.		3	2	
G. Langmann	New York City	.		.	.	.	1	1	.	.				
G. E. Law	Brooklyn, N. Y.	1	0	.	.	.	.	.	.	.		25	18	
Malcolm Leal	New York City	2	0	1	0	20	4	.	.	.				
F. Le Moyne	Pittsburgh, Pa.	.		.	.	.	2	0	.	.		48	23	
F. W. Lester	New York City	.		.	.	.	188	71	.	.		38	14	
J. H. Letcher	Henderson, Ky.	3	1	.	.	.	1	3	.	.				
E. A. Lewis	Brooklyn, N. Y.	15	2	.	.	.	8	4	.	.		1	0	
W. S. Lindsay	Topeka, Kan.	.		.	.	.	.	.	.	.
T. M. Lloyd ⁷	Brooklyn, N. Y.	.		.	.	.	.	.	.	.		0	2	
Christopher Lott	Brooklyn, N. Y.	.		.	.	.	.	.	.	.		6	4	
D. F. Lucas	Brooklyn, N. Y.	.		.	.	.	.	.	.	.		17	7	
Wm. Maddren	Brooklyn, N. Y.	4	2	.	.	.	.	.	.	.		10	7	
S. A. Mahoney	Holyoke, Mass.	.		.	.	.	10	3	.	.		1	0	
Majior	Montreal, Can.	.		.	.	.	7	3	.	.				
G. W. Mason	Bloomington, Ill.	.		.	.	.	6	3	.	.				
A. R. Matheson	Brooklyn, N. Y.	3	1	.	.	.	.	.	.	.		6	0	
Nathaniel Matson ⁸	Brooklyn, N. Y.	.		.	.	.	.	.	.	.		10	9	
Wm. McCollom	Brooklyn, N. Y.	2	1	.	.	.	.	.	.	.		1	1	
J. C. MaeEvitt	Brooklyn, N. Y.	7	1	.	.	.	9	2	.	.				
J. P. McGowan	New York City	1	0	.	.	.	12	4	.	.		1	1	
H. C. McLean ⁹	Brooklyn, N. Y.	.		.	.	.	.	.	.	.		17	7	
James McMannis ¹⁰	Brooklyn, N. Y.	.		.	.	.	33	8	.	.		2	0	
G. McNaughton ¹¹	Brooklyn, N. Y.	2	0	2	0	143	42	.	.	.		3	3	
C. McPhail	Brooklyn, N. Y.	2	0	.	.	.	.	.	.	.
S. A. McWilliams	Chicago, Ill.	.		.	.	.	3	0	.	.				
L. E. Meeker	Brooklyn, N. Y.	.		.	.	.	.	.	.	.		20	16	
F. W. Merriam	New York City	3	0	.	.	.	20	.	.	.				
F. E. Miller ¹²	New York City	3	0	1	0	7	2	1	1	.		4	4	
F. H. Miller	Brooklyn, N. Y.	.		.	.	.	.	.	.	.		9	5	
J. L. Millfinger	.	.		.	.	.	.	.	.	.
S. G. Miner	Detroit, Mich.	11	7	1	0	18	8	.	.	.		6	2	
E. W. Mitchell	Cincinnati, O.	1	0	.	.	.	15	8	.	.				
E. E. Montgomery	Philadelphia, Pa.	28	10	1	1	70	31	.	.	.				
E. C. Morgan	Washington, D. C.	.		.	.	.	6	0	.	.				
T. G. Morton	Philadelphia, Pa.	.		.	.	.	2	0	.	.				

¹ Believes that calomel sublimation, if properly administered and in sufficient quantity—say, 1 drachm (4 grammes) every two hours—will give more recoveries than any other treatment.

² Thinks results would now be more favorable. Has a good opinion of calomel sublimation. In common with others, holds in high esteem the bichloride treatment as published by himself in 1884.

³ Successful case sublimated before and after operation.

⁴ Thinks highly of sublimation treatment.

⁵ All cases operated on were extreme and in most unfavorable circumstances.

⁶ Fatal case of sublimation moribund when seen. As tent support, uses step-ladder or two ladders back to back.

⁷ Deaths from causes other than laryngeal stenosis.

⁸ Has the greatest faith in sublimation treatment.

⁹ All treated by Corbin method since 1888. Better nursing would have given better results.

¹⁰ One of the sublimation cases died of empyema.

¹¹ Does not include two cases of recovery after intubation for relief of non-croupous stenosis.

¹² Is a firm advocate of sublimation; believes also in large doses of calomel in all stages of diphtheria.

STATISTICS OF THE TREATMENT OF TRUE CROUP BY TRACHEOTOMY, ETC.

(Continued.)

NAME.	RESIDENCE.	Tracheotomies.			Tracheotomies after Intubation.			Intubations.			Intubations after Tracheotomy.			Calomel Sublinations.			Tracheotomies or Intubations after Sublination.			Recoveries.
		Recoveries.	Tracheotomies after Intubation.	Recoveries.	Recoveries.	Intubations.	Recoveries.	Recoveries.	Intubations.	Recoveries.	Recoveries.	Calomel Sublinations.	Recoveries.	Recoveries.	Tracheotomies or Intubations after Sublination.	Recoveries.	Recoveries.			
H. H. Mudd	St. Louis, Mo.	117	36	3	2	15	3													
David Myerle	Brooklyn, N. Y.	3	0																	
T. H. Myers	New York City					24	4													
W. H. Nammack	New York City					1	0													
J. W. Niles	Chicago, Ill.					13	1													
J. P. Nolan	New York City					13	12													
N. L. North	Brooklyn, N. Y.	2	0														2	2		
W. A. Northridge ¹	Brooklyn, N. Y.																2	1		
W. P. Northrup	New York City					45	10													
J. F. O'Connell	Brooklyn, N. Y.																2	1		
Joseph O'Dwyer ²	New York City					266	75													
D. O'Shea	Chicago, Ill.	3	2	1	1	98	37	1	0											
A. Otterson	Brooklyn, N. Y.	7	2																	
A. R. Paine	Brooklyn, N. Y.																3	0		
L. L. Palmer ³	Toronto, Ont.	14	2			160	40										4	0		
Roswell Park	Buffalo, N. Y.	15	0	1	0	31	7													
T. K. Perry	Albany, N. Y.					1	0													
C. P. Peterman	Brooklyn, N. Y.																5	4		
J. B. C. Phillips	Brooklyn, N. Y.	3	3														8	0		
L. S. Pilcher	Brooklyn, N. Y.	66	22																	
J. W. Pinkham	Montclair, N. J.	3	0			17	5													
O. H. Presby	New York City					4	1													
O. J. Price	Chicago, Ill.					3	1													
F. K. Priest	New York City					50	14													
David Prince	Jacksonville, Ill.					3	2													
C. G. Purdy	Brooklyn, N. Y.																			
W. P. Pusey	Louisville, Ky.	1	1			70	33										2	2		
P. H. Pyne	Yonkers, N. Y.					91	19													
F. C. Raynor	Brooklyn, N. Y.	1	0	1	0	1	0													
H. N. Read	Brooklyn, N. Y.	35	9	1	1															
E. G. Rehfuss	Philadelphia, Pa.					6	3													
Rehn	Frankfort, Ger.					18	6													
J. J. Reid	New York City					10	4													
E. Reynolds	Brooklyn, N. Y.	8	1														5	5		
J. F. Richardson	Brooklyn, N. Y.	5	1																	
J. R. Richardson	Chicago, Ill.					98	26													
N. S. Roberts	New York City	1	0			9	5													
V. A. Robertson	Brooklyn, N. Y.	1	0														6	0		
J. A. Robison	Chicago, Ill.	12	1			19	11													
T. M. Rochester	Brooklyn, N. Y.					1	1										2	1		
H. C. Rogers	Brooklyn, N. Y.	5	2																	
O. S. Runnels	Indianapolis, Ind.	2	0			4	1													
J. D. Rushmore	Brooklyn, N. Y.	13	2			2	0													
J. F. Russell	New York City					1	0													
Julius Salinger	Philadelphia, Pa.					13	6													
F. C. Schaefer	Chicago, Ill.	4	0	1	0	6	1													
J. C. Schappes	Brooklyn, N. Y.	2	1																	
Julius Scheider	New York City	3	1			11	5													
J. M. Schley ⁴	New York City	5	0			3	0													
J. C. Schminke	New York City					4	0													
A. Seibert	New York City					4	1													
F. S. Sellew	New York City					2	0													
J. H. Seymour	New York City					10	3													
W. W. Seymour ⁵	Troy, N. Y.	4	0			16	4										4	2		
F. W. Shaw	Brooklyn, N. Y.																			

¹ All desperate cases. Neither death from laryngeal stenosis.² Secondary tracheotomy recorded in a few cases, but his own results with that operation were so bad that he seldom thinks seriously of it when intubation fails. If had had even one recovery in ten, intubation would probably still be a thing of the future. In the third series of 100 cases, which gave 30 recoveries, there were 25 consecutive deaths. * First 100 cases, with 17 recoveries, omitted at Dr. O'Dwyer's request.³ Sees no reason or object in intubating after tracheotomy, or vice versa except, in latter case, in the vain hope of extracting membrane.⁴ All died of extension of diphtheritic process.⁵ Believes thoroughly in intubation and regards Casselberry's inversion of the patient as a great advance. Has kept all his recent cases inverted for drainage, and has had no trouble in feeding or administering medicines by mouth.

STATISTICS OF THE TREATMENT OF TRUE CROUP BY TRACHEOTOMY, ETC.
(Concluded.)

NAME.	RESIDENCE.	Tracheotomies.		Tracheotomies after Intubation.		Intubations.		Intubations after Tracheotomy.		Calomel Sublimations.		Tracheotomies or Intubations after Sublimation.		Recoveries.	
		Tracheotomies.	Recoveries.	Tracheotomies	after Intubation.	Recoveries.	Intubations.	Recoveries.	Intubations after Tracheotomy.	Recoveries.	Calomel Sublimations.	Recoveries.	Tracheotomies or Intubations after Sublimation.		
W. E. Shaw ¹ . . .	Cincinnati, O. . .	3	1	.	.	60	21	.	.	.	.	2	2	.	
C. S. Sheldon . . .	Madison, Wis. . .	.	.	.	.	1	1	.	1	1	.	6	6	.	
S. Sherwell ² . . .	Brooklyn, N. Y. . .	20	5	.	.	1	1	0	.	.	.	.	.	.
C. M. Shields . . .	Richmond, Va. . .	.	.	.	.	1	0	.	.	.	.	.	.	.
B. T. Shinnwell . . .	Philadelphia, Pa. . .	6	0	1	0	137	63	.	.	.	.	.	.	.
F. J. Shoop . . .	Brooklyn, N. Y. . .	2	0	.	.	.	.	.	.	.	.	.	.	.
W. K. Simpson . . .	New York City . . .	.	.	.	.	20	2	.	.	.	.	.	.	.
H. W. Skerry . . .	Brooklyn, N. Y. . .	3	1	.	.	19	9	.	.	.	.	.	.	.
Geo. Skinner . . .	Hamilton, Ont. . .	.	.	.	.	17	6	.	.	.	.	.	.	.
S. Solis-Cohen . . .	Philadelphia, Pa. . .	1	0	.	.	6	2	.	.	.	.	.	.	.
Sotay Lastra . . .	Seville, Spain . . .	.	.	.	.	14	4	.	.	.	.	.	.	.
W. E. Spencer . . .	Brooklyn, N. Y. . .	7	5	.	.	.	.	.	.	.	.	3	2	1	1
R. J. Stanton . . .	New York City . . .	.	.	.	.	19	9	.	.	.	.	.	.	.
W. G. Stark . . .	Hamilton, Ont. . .	.	.	.	.	11	2	.	.	.	.	.	.	.
James Stenhouse . . .	Denver, Col. . .	.	.	.	.	1	0	.	.	.	.	.	.	.
M. J. Stern . . .	Philadelphia, Pa. . .	.	.	.	.	6	3	.	.	.	.	.	.	.
A. B. Strong . . .	Chicago, Ill. . .	27	5	1	0	82	23	.	.	.	.	1	1	.	
F. H. Stuart . . .	Brooklyn, N. Y. . .	5	2	.	.	.	.	.	.	.	.	10	4	.	
J. D. Sullivan ³ . . .	Brooklyn, N. Y. . .	1	0	.	.	.	.	.	.	.	.	.	.	.
W. F. Swahn . . .	Brooklyn, N. Y. . .	1	0	.	.	.	.	.	.	.	.	.	.	.
John Tascher . . .	Chicago, Ill. . .	.	.	.	.	23	11	.	.	.	.	.	.	.
Thiersch . . .	Germany . . .	.	.	.	.	32	3	.	.	.	.	.	.	.
George Thilo . . .	Chicago, Ill. . .	.	.	.	.	7	4	.	.	.	.	.	.	.
C. M. Thomas . . .	Philadelphia, Pa. . .	42	9	3	0	13	0	.	.	.	.	.	.	.
F. Tipton . . .	Selma, Ala. . .	.	.	.	.	1	1	.	.	.	.	.	.	.
M. W. Townsend . . .	Bergen, N. Y. . .	13	7	.	.	.	.	.	.	.	.	.	.	.
F. Van Fleet . . .	New York City . . .	.	.	.	.	22	7	.	.	.	.	.	.	.
W. V. Van Lennep ⁴ .	Philadelphia, Pa. . .	.	.	.	.	3	0	.	.	.	.	.	.	.
N. Volkenberg ⁵ . . .	New York City . . .	.	.	.	.	14	5	.	.	.	.	.	.	.
G. Wackerhagen . . .	Brooklyn, N. Y. . .	15	4	.	.	.	.	.	.	.	.	.	.	.
Waldon Smith . . .	England . . .	.	.	.	.	3	2	.	.	.	.	.	.	.
William Wallace ⁶	Brooklyn, N. Y. . .	14	6	.	.	.	.	.	.	.	.	.	.	.
F. E. Waxham . . .	Chicago, Ill. . .	30	1	6	0	425	151	.	.	.	.	.	.	.
J. B. Wheeler ⁶ . . .	Burlington, Vt. . .	2	0	.	.	17	6	.	.	.	.	.	.	.
J. A. White . . .	Richmond, Va. . .	.	.	.	.	4	0	.	.	.	.	.	.	.
H. F. Williams . . .	Brooklyn, N. Y. . .	7	3	.	.	.	.	.	.	.	.	7	4	.	
J. M. F. Winfield ⁷	Brooklyn, N. Y. . .	.	.	.	.	.	.	.	.	.	.	.	.	.
J. E. Winters . . .	New York City . . .	.	.	.	.	6	0	.	.	.	.	.	.	.
F. W. Wunderlich .	Brooklyn, N. Y. . .	12	3	.	.	.	.	.	.	.	.	6	2	.	
Chas. Zellhorfer . . .	Brooklyn, N. Y. . .	2	1	.	.	.	.	.	.	.	.	.	.	.
Totals.		2417	586	70	11	5546	1691	5	2	505	275	85	29		

¹ Is convinced that the tube should be removed as soon as the case does badly for any cause; if necessary, the tube may be re-introduced. Finds it almost impossible to get consent to tracheotomy until the favorable time has passed.

² Tracheotomies all late operations.

³ Believes that tracheotomy and intubation yield equal results.

⁴ In one case, tube left in larynx twenty-three days. Uses bichloride of mercury in large doses.

⁵ Oldest patient, 56 years old; youngest, 22 months.

⁶ Prefers intubation; is not aware of a recovery after tracheotomy in his city.

⁷ One case died of paralysis one week after disappearance of diphtheritic croup.

The Brooklyn method of treatment of croup which was described in last year's ANNUAL has gained many warm supporters during the past few months. This method was first employed in November, 1874, by Job Corbin, according to Maddren,¹⁵⁷ the black oxide of mercury being the first material used in sublimation, calomel being afterward substituted. The advocates of this plan insist that the sublimation should be begun early, not only

to relieve dyspnoea, but to stop the formation of the pseudomembrane. The quantity of calomel used in each sublimation should be from 30 to 60 grains (2 to 4 grammes), the sublimation to be completed in as short a time as possible. This may be repeated within half an hour if the breathing is specially labored and difficult; otherwise it may not be necessary for two or three hours. The amount of calomel used upon a case, according to Maddren, varies from $\frac{1}{2}$ to 8 ounces (16 to 248 grammes), the latter amount having been used upon a case that recovered.

Pritchard²²⁴ _{May 6} believes that during an attack of croup the temperature of the room should be kept as high as can be endured with comfort, and, of course, the air should be saturated with steam; he makes an earnest plea for the early performance of the operation of tracheotomy. The administration of calomel internally is an old remedy, and the fact of the success obtained recently by sublimation has evidently turned the thoughts of experimenters backward. Batten¹⁹⁹ _{July} reports three cures of laryngeal diphtheria by the administration of calomel and whisky in large doses; one case, a child about 3 years of age, during an attack which lasted from September 19 to October 3, 1892, took 876 grains (56 grammes) of calomel and about a quart (litre) of whisky, and recovered. There is no question but that, in these cases of croupous laryngitis, whether diphtheritic or not, only benefit can be derived from a preliminary calomel purge.

On theoretical grounds, Sziklai²⁹⁷ _{Sept. 6} recommends the administration of pilocarpine hydrochlorate in croup. This remedy is also advocated by Degle.¹¹⁶ _{Feb.}

The iodide of soda in the treatment of true croup has been recommended by Smart,¹⁰⁶ _{Apr., 192} who reports twelve cases, with a mortality of 50 per cent.

During a period of six years (1885-90) there were 51 patients with croup treated in the isolating wards of the hospital at Nantes⁶⁷ _{Mar. 5}; of these, 31 died. Twenty-six of the entire number were treated by vaporizations of turpentine and eucalyptus; of these, 9 died. Seventeen of the 26 cases were operated upon, 6 dying.

Hoppe-Seyler³²⁶ _{189, 1890} reports 455 cases of diphtheria observed at Kiel during 1889 and 1890, nearly half of which died. Treatment consisted of sublimate spray and chloral spray, and, internally,

turpentine, cognac, and wine. Tracheotomy was performed in 213 cases, with about 33 per cent. of cures. In 26 cases of death after tracheotomy, the cause was found to be bronchial croup; in the others, paralysis of the heart.

In Hagedorn's clinics ³⁰¹_{B.33,H.6} 572 tracheotomies were performed in six years for croup; of these cases, 316, or 55½ per cent., died.

F. E. Waxham, of Denver, ¹⁵⁵_{p.133} whose experience in cases of true croup is well known, has recently perfected an improved set of instruments for the performance of intubation, of which the chief points are as follow: 1. A metallic case which may be boiled, steamed, or otherwise rendered antiseptic. 2. The introducer differs from the older instrument of O'Dwyer, inasmuch as the obturator has no joint and is not screwed upon the instrument, but is a plain band of steel solidly attached to the introducer. Moreover, the instrument can be taken apart; there are no crevices in which septic matter can be concealed and which cannot be reached by antiseptic solutions. The gag and extractor are made on the same principle, it being possible to take them apart for purpose of disinfection.

Chronic Croup.—Two cases of chronic croup have been reported by F. Egidi. ⁴⁶¹_{Jan.} In both cases the membrane was present forty days. In the first case stenosis of the larynx occurred, from hyperæmia and the thickened condition of the mucous membrane, for three months after the cannula was removed. In the second case the cannula was removed on the forty-sixth day, but in a short time the stenosis reappeared. Tracheotomy a second time was refused and intubation was performed. Five days later the tube was expelled and death followed.

PERTUSSIS.

Etiology.—Ritter, of Berlin, ⁴_{No.60,92} describes a micro-organism in the patient's sputum,—a very small coccus,—which he believes to be the pathogenic germ of the disease. He collected expectoration from the mucous lining of the larynx, at the termination of a paroxysm of coughing, in 19 cases, placed it in a sterilized vessel, and carefully washed it with distilled water. Small opaque particles were found, which were cultivated on agar-agar. Small colonies were found within twenty-four hours, opaque and grayish in color, and adhering firmly to the surface of the cultivating medium.

Age.—Currier¹⁹ reports the case of a child attacked by whooping-cough at the age of 10 or 11 days. When it was born, two other children in the family were suffering from the disease. The mother had a persistent cough, similar in character to the others, but without the whoop.

Treatment.—Bromoform seems to be the generally selected remedy of late. Many clinicians have given strong testimony in its favor during the past three years. Duncan³⁹ believes in its cautious use; he would not give it more than four times in twenty-four hours. Cassel⁶⁹ has satisfactorily treated a number of patients with it. Nolden, of Cologne,¹¹⁶ has reported two cases of poisoning from the use (or abuse) of this drug, and utters a note of warning regarding it. Burton-Fanning¹⁵ mentions a case of poisoning by bromoform in a child who had found a bottle and drunk an unknown quantity from it. This writer reports the results obtained from the administration of the remedy in thirty cases. These were very gratifying, usually on the second day of treatment; the number of paroxysms were much fewer, and the attacks much shorter and less violent; vomiting and epistaxis ceased, expectoration became easy, and the bronchitis disappeared rapidly.

The author administers it with pulverized tragacanth and simple syrup, and believes the appropriate dosage to be as follows: mss (0.003 gramme) for children under 1 year; mj (0.65 gramme) for children up to 3 years; mij (0.13 gramme) for children up to 6 years. Thrice daily to begin with. These doses must be increased with great caution. He also cautions² against using the last dose in the bottle, which may contain a poisonous quantity, owing to the mixture having settled.

Guttmann¹¹⁶ reports favorable results from the employment of insufflations of soziodol-sodium. He treated thirty cases, blowing about 3 grains (0.2 gramme) of the powdered drug into each nostril once daily. Six children were treated as in-patients; two of these were discharged cured within eight days; in the other four cases the frequency and severity of the attacks were greatly diminished within from four to six days. The other patients were treated in the dispensary and with good effect, but not so well marked as those constantly under care and observation.

Resorcin in the treatment of whooping-cough is recommended

by Gamba, of Rome ¹⁰⁹⁷_{Jan. 25}; by J. Lewis Smith, ⁵⁹_{June 13} and by Soula, of Toulouse. ⁹⁹⁶_{May 10}. According to these writers, the insufflations of the drug diminish the intensity and frequency of the paroxysms.

Antipyrin still has its advocates; among others, Soula ⁹⁹⁶_{May 10} and Marfan ³¹_{Mar. 11} recommend its employment.

Intubation for the relief of the spasm is advocated by Taub, of Budapest. ⁶²²_{No. 2}

Thymus serpyllum, in the form of the tincture, is strongly advocated by Straley, ⁷⁶⁰_{Apr. 1} by whom it is regarded as a specific. Rectal injections of carbonic acid are recommended by Bergeron. ²¹¹_{June 26}

Complications.—A case of oesophagism, presenting all the characteristics of hydrophobia, and occurring in a young girl, is reported by de Bauvais. ³¹_{May 23}. This complication of pertussis is very rare, and is dependent chiefly on mental impressions. Norman ²_{Nov. 12, '92} reports a case of subcutaneous emphysema in a child, 2 years old, suffering from whooping-cough. Wherever the hand was placed over the whole of the chest, neck, back, and sides, there was the characteristic crackling feel of cellular tissue filled with air. This case terminated fatally in a short time.

A case of whooping-cough complicated by diphtheria was made the subject of a paper by Taguet. ⁷⁰_{July 30}. Laryngeal stenosis occurred and tracheotomy was performed, the patient making a good recovery.

The urine in pertussis has been made the subject of special study by Blumenthal and Hippus, ⁵⁸⁶_{No. 47, p. 1199, '92} who established the following points: From the commencement of the disease up to its height the urine is pale yellow, very acid, of high specific gravity, and containing a variable quantity of uric acid.

A case of nephritis complicating whooping-cough is reported by Lokkenberg. ⁵⁸⁶_{No. 51, p. 1396, '92}

Koplik ¹_{July 1} read a paper on heart-strain in pertussis, before the American Pædiatric Society, discussing the mechanical effect of the paroxysms upon the pulmonic and systemic circulations.

PAROTITIS.

Etiology.—Laveran and Catrin ⁵⁵_{June 3} have communicated to the Société de Biologie the results of their bacteriological researches in mumps. They have found, in 67 cases out of 92, a diplococcus

in the blood, in the secretions of the parotid, in the testis (when an orchitis occurs), and in the joint-fluid (when an arthritis complicates the disease). Inoculation of animals has, as yet, yielded no results.

Inoculation.—According to Marklen⁴²⁰ _{Mar. 10} the period of incubation varies greatly, being from fifteen to twenty-six days in duration.

Infection.—That parotitis is infectious, at the termination of the period of incubation, is shown in the following cases reported by Rendu⁶ _{Mar. 4} :—

On January 3d a woman developed mumps; on January 24th her daughter, who had visited her on the 2d, and not since, and who, in the interval, had seen no person suffering from the disease, was likewise attacked.

A second was very similar. A child was attacked, after being in company with a friend, who developed the disease a few hours afterward.

Complications.—By far the most important complication of parotitis is the one of most common occurrence,—orchitis. In certain cases it may be preceded by an epididymitis, according to Janicot.⁴²⁰ _{Feb. 24}

The gravity of orchitis as a complication depends upon the fact that atrophy of the testis is apt to occur.

The following tables are given by J. Comby,⁷³ _{Feb. 11} as proportion of orchitis in several epidemics, and the proportion of cases in which atrophy occurred :—

Epidemics.	Cases of Mumps.	Cases of Orchitis.
On board the <i>Ardent</i> (Noble),	12	12
Mascara (Thierry, Mangras),	76	22
Arras (Rizet),	22	10
Army of the Loire (Vidal),	26	10
Antibes (Chauvin),	45	17
Dijon (Juloux),	35	14
Chatain,	37	9
Albi (Laurens),	118	32
Oléron (Bussard),	28	13
Amiens (Sorel),	35	15
Bayonne (Servier),	105	26
Dax (Jourdan),	61	11
Melun (Madamet),	56	7
Auxonne (Gérard),	43	13
Total,	699	211

Epidemics.	Cases of Orchitis.	Cases of Atrophy.
Mont-Louis (Dogny),	27	27
Chatain,	9	3
Antibes (Chauvin),	16	6
Dijon (Juloux),	14	14
Albi (Laurens),	32	16
Amiens (Sorel),	13	7
Bayonne (Servier),	23	12
Dax (Jourdan),	11	10
Melun (Madamet),	7	4
Auxonne (Gérard),	11	4
Total,	163	103

Jarvis ^{May 27} reports an epidemic occurring at Fort Apache, among the soldiers. There were 40 patients and 13 cases of orchitis, with atrophy in 3 cases.

According to Cartrin, ^{July 6} ³⁷⁸ rheumatism occurs as a complication in 2.8 per cent. of all cases, with or without endocarditis.

Albuminuria, as a complication, has been observed many times since Renard, in 1856, first described its occurrence. G. Comby ^{Jan. 31} ¹⁷ and Bezy ^{Mar. 5} ¹⁴ have recently testified to its frequent presence.

A case of deafness from mumps has been reported by Foster. ^{Sept. 72} This is of rather rare occurrence, and has been ascribed to a peculiar metastasis affecting the labyrinth. F. M. W.

SCARLET FEVER, MEASLES, VARICELLA, AND RÖTHIELN.

BY C. SUMNER WITHERSTINE, M.S., M.D.,
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SCARLET FEVER.

Etiology and Pathology.—An editorial² states that in the month of August, 1892, an epidemic of scarlet fever in the south side of Glasgow was demonstrated to be associated with the milk-supply from a particular farm. The evidence that the milk could not have been contaminated in transit between the farm and the consumer seemed conclusive. The circumstances connected with the outbreak at the time were briefly these: That, while a child was found at the farm suffering from the disease, the date of sickening of the child and the dates of sickening of the customers pointed to the child being infected from the same source as the customers, and not to it being the source of infection of the rest; that the cows at the farm were found to be suffering from a teat-eruption, and that circumstances pointed very definitely to the cows as the source of infection. Lymph and crusts from the affected cows were sent to Klein, who stated that from the lymph there was isolated by cultures a streptococcus resembling that isolated from the ulcers on the teats of the cows implicated in the Hendon outbreak (ANNUAL, 1888, v. iv, p. 348), and exhibiting the character it was found to possess of curdling milk when grown in it at a temperature of 37° C. (98.6° F.), and of acting virulently on wild house-mice, and slightly on tame white mice. Experiments on calves with the scabs proved the presence in them of two viruses, one producing true vaccinia, another a non-vesicular eruption. The second virus produced a red, raised area, at no time an umbilicated vesicle, but gradually a brown crust appeared on the line of insertion, which broadened and thickened, and which remained firmly adherent for fully fourteen days. If it were forcibly removed, a sore was found beneath it, but in twenty-four hours a new crust had formed, and the falling of the crusts and

healing of the sore were not completed till about three weeks from the date of inoculation. Scrapings of the non-vesicular eruption, taken on the seventh day, when used to inoculate a calf, produced a similar non-vesicular eruption, which ran a similar course. Scrapings from this calf were used to inoculate a third calf, with similar results. These calves were found to be not protected from vaccinia. The whole course and characters of this non-vesicular eruption reminded Klein of the eruption produced on calves with a crust from the sore on the teat of a cow associated with the Camberwell outbreak. It seems clear enough that the eruptions on the teats of the cows associated with the Glasgow outbreak were of two varieties at least, one that of true vaccinia, and another of a specific character, but not vaccinia; that these, owing to the friction with the milkers' hands in milking, etc., were rendered indistinguishable from each other, and that the friction had even rendered the true vaccinia vesicles unrecognizable as such. The contrast between the Hendon and Camberwell outbreaks and that of Glasgow consists in this: that the cattle in the Glasgow outbreak presented no appearance suggestive of desquamation, and no evidence of a constitutional disturbance. A very remarkable circumstance, however, remains to be noted. The supply of milk from the implicated farm was stopped on August 6th. On August 12th as many of the cattle as seemed to have recovered from the local affection of the udders and teats were separated from the rest of the herd, and on August 23d milk from these was sent to Glasgow, to a dairy quite apart from that of the previous outbreak, and with direction that it was to be sold unmixed with the produce of any other byre. On August 25th one case of scarlet fever occurred among the consumers, on each of the two following days three cases, and each subsequent day one, two, or three new cases, till August 30th, when the supply was again stopped. Cases, however, continued to occur among those who had consumed the milk till September 8th. All the facts connected with this outbreak suggest a relationship between a disease of cows and human scarlatina parallel to that between vaccinia and small-pox. (See ANNUAL, 1890, vol. iv, I-4.)

During the past three years E. P. Hershey, of Denver,⁹ has made an effort to ascertain the origin of contagion in the cases that came under his observation, and found that at least 70 per

cent. were either supposedly or directly due to contact with other children at school. As to the remaining 30 per cent., the source was either unknown or was ascribed to direct exposure.

A. B. Duffin, of London,^{10/77} notes a remarkable instance, where the paper had been left on the walls of a room in which there had been scarlet fever; fresh paper had been put on several times without removing the original paper. A new family came into the house and took down all these layers of paper, thus liberating the scarlet-fever poison and causing an outbreak of the disease in the family. J. B. Hamilton, of Dublin,^{June 3} mentions a rather singular mode of infection observed by him during the "Dublin outbreak." The family of an officer occupied a large house in the suburbs of Dublin. Two of the children contracted scarlet fever and were isolated in a room at the top of the house, every possible sanitary precaution being taken to prevent the disease spreading. All went well for a fortnight, and just as the children above were convalescing those in the basement took the disease. It seemed impossible to account for it in any way by direct infection; but one day Hamilton chanced to see a cat sleeping in the bed with the convalescents upstairs, and on making inquiries he found that the animal had been in the habit of passing the day with the sick children upstairs and the night with the healthy children below. No doubt the cat carried the infection on his coat from one to the other.

Dawson Williams, of London,^{15 July} rightly considers unrecognized cases as an occasional means of disseminating this disease. These cases occur chiefly in adults, and during an epidemic all cases of sore throat in adults should be regarded with suspicion; the patients themselves may never have any rash and may not be very ill, but they are quite capable of giving the disease in its most typical form to children with whom they are brought into close relation.

Burlureaux, of Paris,^{Dec. 10, '92} has found, in the blood of every case dying from scarlet fever, streptococci resembling those found by Laveran, Vaillard, and Vincent, in cases of infectious influenza. Dochle¹¹⁸ found two distinct parasites in the blood of five scarlatinous cases: (a) small, flat, spherical corpuscles, measuring 1μ , provided generally with a whip-like appendage of about the same length, terminating in a bulbous extremity; (b) corpuscles made up of two nuclei, surrounded by a clear zone and of protoplasm,

two or three times as large in area as the nuclei, finely granular and containing pigment granules. The movement of these cells, which is slight, is produced, for the most part, by contraction of the protoplasm. They are seen either outside the red blood-corpuscles or inclosed within them. These corpuscles may be cultivated. The author has also observed these protozoan parasites in the blood of measles (ANNUAL, 1893, vol. i, J-14) and variola; he believes them to be the pathogenic agents of these affections. Sporulation appears to take place in measles and variola, but not in scarlet fever.

Booker, of Baltimore,^{Oct., Nov., '92}⁷⁶⁴ has published a report of the examination of pseudodiphtheritic angina in scarlet fever. In none of the cases in which there was membrane did he find the Loeffler bacillus. In all he obtained a streptococcus which differed from the streptococcus of crysipelias essentially in that its vitality in culture media was short. In one of Booker's cases there was a membranous deposit on the tonsils on the second day of the disease, and two days before the appearance of the scarlatinous rash. The organism was similar to that observed in the other cases. This case is comparable to two reported by Henry Jackson, of Boston,^{Aug. 17}⁹⁹ in which the membrane preceded the rash two and three days respectively. Streptococci were found in cultures from the membrane, but no baeilli of diphtheria. In two other cases examined after death by Councilman, of Baltimore,^{Aug. 17}⁹⁹ pure cultures of streptococci were found in the glands about the neck, and in most of the internal organs. It is interesting to note that in one of the cases cultures from the kidney were sterile and no organisms were discovered in the kidney, though there was an acute nephritis, the acute inflammation having been set up by the toxins produced by the bacteria. An investigation of a considerable number of cases of membranous inflammation of the throat in scarlet fever, made later by Councilman and Williams, demonstrated the presence of the Loeffler bacillus. In the light of this work, remarks Jackson, it is wrong to say that the membranous affection of the throat in scarlet fever is absolutely distinct from the very similar pathological process in diphtheria.

T. J. Bokenham and W. S. Fenwick, of London,^{Aug. 19}² at the annual meeting of the British Medical Association, read a paper on the "Pathological Effects of Certain Substances Derived from the Spleen in Cases of Scarlet Fever." Their conclusion is that

in cases of rapidly-fatal scarlatina a morbid product of a proteid nature is formed, which can be extracted from the spleen in small quantities. This substance, when introduced into the circulation of an animal, is rapidly excreted by the kidneys, and, acting as an irritant to the secreting structure, tends to produce a condition of acute parenchymatous inflammation. This result is obtained even when the solution has been previously boiled.

Henry W. Cattell, of Philadelphia,⁴⁵¹ reported an interesting case of scarlet fever in which death occurred on the eighteenth day. At the post-mortem examination numerous dendritic growths were found in the middle third of the œsophagus. They were evidently of bacteriological character, and occupied one-third of lumen of the œsophagus, and must have rendered the passage of food extremely difficult. The lymphatics were markedly enlarged, numerous, and haemorrhagic. The lungs were filled with haemorrhagic infarcts and areas of catarrhal pneumonia. The accompanying illustration shows the macroscopic appearance of the specimen, which was placed, immediately after removal, in a saturated solution of bichloride, and the photograph therefore shows a more-contracted appearance than that which it presented at the post-mortem. A piece of the growth, teased in water and stained, showed the presence of at least eight different morphological varieties of micro-organisms; one resembling the Klebs-Læffler bacillus was present in small numbers. No streptococci were found.



DENDRITIC GROWTHS IN THE ÖSOPHAGUS IN A CASE OF SCARLET FEVER. (CATELL.)
International Medical Magazine.

Incubation.—Dawson Williams, of London,^{15 July}, while preparing the report of a committee appointed by the Clinical Society of London to investigate the periods of incubation and contagiousness of certain infectious diseases, was led to give special attention to this subject. The cases upon which the report is founded, while confirming the opinion that the period of incubation is not constant, go to prove that the variations occur within narrower limits than would appear from assertions commonly made. The incubation period of scarlet fever, the author states, has been variously estimated at from one day to one month; no one of the large number of cases examined in the report, however, gives positive evidence of a period of more than seven days, and this only in rare instances; the ordinary period being found to be between one and four days. The number of cases in which the period of incubation terminates on the second day is about the same as those terminating on the third day, and this is only a little in excess of the number terminating on the fourth day. Variations in this period, the author states, would appear to depend upon variations in the resistance of the individual, and in the virulence or dose of the virus. In estimating the value of evidence as to the duration of periods of incubation, the author charges us to be on our guard against certain sources of fallacy, commonest and most important among these being: Unintentional isolation during the early stage of the disease, retention of infection in fomites, and the occurrence of mild, unrecognized, and untreated cases of the disease. Gradual onset of illness by indefinite symptoms he regards as another, but less serious, source of error. From the Clinical Society's report the following conclusions are reached:—

	Usual.	Minimum.	Maximum.
Committee of Clinical Society (1892)	2 or 3	1	7
Bristowe (1887)	6 to 8	often less	{ occasionally longer
L. Guinon (1891-92)	4 or 5		
Strümpell (1887) . . . . .	.....	less than 4	7

Fiessinger, of Oyonnax,^{51 Sept.} notes in nineteen cases the period of incubation—dating this from a single, passing exposure to the appearance of the eruption—as follows: 10 hours, one case; 24 hours, one; 2 days, two; 4 days, two; 5 days, one; 8 days, one;

10 days, one. J. B. Hamilton, of Dublin, ², claims, from an experience in a severe outbreak of scarlet fever among the troops in Dublin and in the Station Hospital at Portobello, in 1883-84, that the usual period is from three to four days.

Symptomatology.—Burlureaux, of Paris, ²¹², _{Dec. 10, 72} insists upon the importance of the throat symptoms in scarlet fever. He has followed out this line of investigation for three years at the hospital of Val-de-Grâce, and demonstrates, from most careful observation, that the angina determines the gravity of the case, and, furthermore, that it is the primary cause of death in scarlet fever. If there be a considerable amount of false membrane present, the prognosis is grave. When, on the contrary, there is but little false membrane in the fauces, a favorable prognosis may be given, whatever be the grade of fever or the general symptoms. Nephritis, the author states, is rare after scarlet fever when the throat has been properly attended to.

Spiers, of Montreal, ²⁸², _{Sept.} in a paper read before the Montreal Clinical Society, stated that he had observed some cases in which the temperature remained high for days without apparent sufficient cause; in all there was marked pallor. In one case the rash was marked by general venous hyperæmia.

William V. Wilson, of West Haven, Conn., ¹⁷⁶, _{Mar. to June} in an excellent paper on the causes of vomiting in scarlet fever, enumerates these causes as follows: toxæmic, constipation (early in the disease), cerebral, thermic, circulatory, intestinal (diarrhoea), nephritic, uræmic, and those due to secondary complications of the heart or lungs. He notes the fatal case of a child whose stomach was overloaded during convalescence; vomiting ensued, as the result of gastritis, and could not be checked.

Until the present time very little notice has been taken of the occurrence of peptonuria in scarlet fever. Obermüller was the first to call attention to it, followed later by Heller, Binet, and Loeb. E. Arslan, of Paris, ⁵⁵, _{Feb. 25} after extended experiments, states that peptonuria is a symptom of the highest importance, and should be looked for in all cases. It is of prognostic importance in the early stage. His observations comprise twenty-one cases of scarlet fever in which the urine was examined every day, often twice, while due regard was paid to the other symptoms. In eleven cases in which the disease ran its ordinary course, the urine con-

tained no peptone. On the other hand, it was constantly present in the urine of the other ten cases, in which various complications occurred. From this research Arslan feels warranted in drawing the following conclusions: 1. No peptone is found in the urine of mild cases of simple scarlatina. 2. The urine contains peptone in grave cases of the disease, associated with complications, the occurrence of the latter being preceded by peptonuria. 3. The presence of a considerable quantity of peptone in the urine is an unfavorable sign. 4. The peptonuria is in no way influenced by the presence of albumen, the condition of the pulse, or temperature. 5. In grave cases, and in those complicated with gastro-intestinal disturbances, indicanuria becomes superadded to peptonuria.

Complications.—Henry Jackson, of Boston,^{Aug. 17}, gives in detail the complications and variations from usual symptoms in 53 cases observed by him at the Boston City Hospital. They may be grouped as follows:—

	Cases.
Membrane in throat,	20
Otitis media purulenta,	9
Primary albuminuria (all with high temperature),	3
Nephritis later in the disease,	6
Abundant vesicular eruption in addition to usual scarlet rash,	3
Lobar pneumonia,	3
Wide-spread bronchitis, and probably broncho-pneumonia,	3-5
Elevation of temperature later in desquamation without assignable cause,	7

Hyperpyrexia was a complication in a case observed by J. Clay Beckitt, of Wigan, Eng.^{Aug. 26}.⁶ The patient was a boy aged 8 years. Nothing unusual was noted until five days after the disappearance of the rash, when his temperature rose suddenly to 103° F. (39.4° C.). Two days later, a half-hour before death, the temperature was 115° F. (46.1° C.). The thermometer used in this observation was checked by two others, which registered the same. The urine was examined, with a negative result. A somewhat similar case is reported by Courtade, of Paris,^{Mar. 26},²⁴ but the temperature was not so high (106.9° F.—41.6° C.), and the patient recovered.

Arnold W. W. Lea, of Pendlebury, Eng.,^{Sept. 90} reports a case of scarlet fever complicated with infective endometritis, which was fatal on the thirteenth day. B. E. M'Kenzie,^{Jan. 39} records a case of separation of the femoral epiphyses at both hips, during scarlet

fever, in a boy aged 4 years. Examination a year later showed no improvement. W. J. Brand, of Detroit, ¹⁸⁵_{Dec. 92} details the history of a case of scarlet fever concurrent with typhoid fever. W. Iliffe and Taylor, of Derby, Eng., ²_{Jan.}, each report a case of concurrent scarlet fever, measles, and diphtheria.

Sequelæ.—N. S. Manning, of Birmingham, ²_{Apr. 1} has observed that in 2.1 per cent. of nearly 6000 cases of scarlet fever and diphtheria treated in the City Hospital, Birmingham, and in 4.8 per cent. of the patients that were under 5 years of age, a condition supervened which was accompanied by a characteristic skin eruption, increase of temperature, wasting of the tissues, and loss of power; and which, on account of the high mortality that followed, may well be considered one of the most important complications that can become superadded to these diseases.

The exciting cause appeared to be the absorption into the system of a toxic agent or poison, which was engendered by tissue necrosis taking place in septic surroundings, and in these cases it followed the process of ulceration in the throat, mouth, and nasal cavity in scarlet fever and diphtheria.

R. W. Murray, of Liverpool, ⁶_{Feb. 11} reports a case of purpura as a sequel to scarlet fever. The patient, a boy aged 2 years, developed petechiæ generally over the body. There were subconjunctival haemorrhages and bleeding from the gums, nose, and stomach, and two large subcutaneous haemorrhages, one in the right parotid region, the other in the inguinal region (the site of an operation wound). He became very pale. The urine contained red blood-corpuscles, leucocytes, and epithelial, blood, and hyaline casts. The patient died. Sidney Phillips, of London, ⁶_{Aug. 12} mentions another case of purpura haemorrhagica occurring after scarlet fever, associated, however, with acute rheumatism and ending in recovery. G. Sharp, of Edinburgh, ²_{Dec. 24, 92} and A. K. Bond, of Baltimore, ¹⁰⁴_{Oct. 8, 92} each report a case of post-scarlatinal nephritis with uræmic convulsions. Both patients recovered, the former after venesection.

Recrudescence.—James Hunter, of Linlithgow, ²_{Dec. 31, 92} describes a case in which, six weeks from the beginning of an attack of scarlet fever and during apparent convalescence, the patient again presented the typical symptoms of the disease (fever, rash, angina, and glandular swelling). A similar case is recorded by F. Martin, of Toronto, ³⁹_{Aug.} in which desquamation occurred twice. Where a

fresh infection was not likely, as in the foregoing cases, Hunter recalls the explanation of Hénoch, namely, that the virus had not been completely eliminated by the first attack.

Secondary Attacks.—J. M. Kennedy, of New York, ⁵⁹ Apr. 10 records three cases of scarlet fever with secondary attacks occurring in one family. The cases would seem, the author states, to indicate a family susceptibility to the disease, and also that the changed conditions of life may possibly have had some influence upon it, two of the children having had the disease first in Scotland and the second attack in this country, the other child having had both attacks in this country. These cases differ from the preceding, in that there is a history of a second exposure to contagion.

Anomalous Cases.—Ch. Fiessinger, of Oyonnax, ⁵⁵ Mar. 4, 11 calls attention to apyretic scarlet fever. He concludes his paper as follows: 1. There is a form of scarlet fever in which the fever may be entirely absent (below 38° C.—100.4° F.—by the rectum) or in which the temperature may be but slightly elevated, and that in an essentially transitory manner (38° to 38.5° C.—100.4° to 101.3° F.—by the rectum). 2. This form of scarlet fever is observed in the same epidemic and alongside of the grave and pyretic forms; it is contagious, and may give rise to the ordinary scarlet fever, complicated with Bright's disease or with a pseudomembranous angina. 3. There is no local sign to differentiate the apyretic from the ordinary form; the angina, the eruption, and the desquamation are the same in their aspect and duration; the state of the tongue is, on the contrary, a little modified; the raspberry tongue, bristling with papillæ, so peculiar to the ordinary scarlet fever, is not seen. 4. The pulse is not always accelerated in the apyretic scarlet fever. 5. Apyretic scarlet fever is characterized by the absence of general phenomena. The sleep at night is sometimes broken, but otherwise the patients do not seem to suffer and are happy. 6. The diagnosis from certain scarlatinoid erythema is very difficult; it is a question whether the same germ, infectious in different degrees of virulence, does not produce both these erythema and the classical scarlet fever.

J. G. Carpenter, of Stanford, Ky., ^{22¹, July 29 and B. F. Harmon, of Dye, Mo., ⁸⁵⁰ Sept., 92 each report cases of *scarlatina sine eruptione*. In the latter, eight days after seeming convalescence, a typical attack occurred, with the usual rash. R. E. McKechnie, of Wellington,}

B. C.,²⁸² cites four cases in which an anomalous rash occurred; angina, fever, and typical rash were closely followed by the appearance of small dark-red papules on the extremities and free desquamation.

Scarlet Fever in Adults.—C. Gimmel,³²⁶ B.S.I.H.I reports 1818 cases of scarlet fever which occurred in Zurich in eight years; 274 of these were in adults, or 15 $\frac{8}{10}$ per cent. of the whole number. He concludes his article as follows: 1. Adults are somewhat less disposed to scarlet fever than children. 2. The longer the time which has elapsed without an epidemic of scarlet fever, the greater the number of adults seized with the epidemic when it occurs. 3. The disease is less severe in adults than in children. 4. Nephritis is less common, and is not so severe. 5. Articular rheumatism is a more-frequent complication in adults. 6. Scarlet fever, conveyed by wounds, occurred in the author's cases only in adults. Alex. Howie, of Westbury, Eng.,² Sept., reports two cases of scarlet fever in adults, one aged 52, the other 79 years.

Scarlet Fever in a Japanese.—A. S. Ashmead, of New York, June 10¹, remarks the rare occurrence of scarlet fever among the Japanese. It is even denied by some authorities that the Japanese are ever subject to this malady. However this may be true of the Japanese in their own country, it is not so in regard to those who come to this country. Ashmead, in consultation with Benjamin Ayer, of Brooklyn, was recently called to see a clear case of scarlet fever in a young Japanese gentleman, aged 23 years, offering a febrile and eruptive history appropriate to that disease. The throat symptoms were marked, but there was no albuminuria. Desquamation was somewhat tardy and protracted, as if taking place in an integument not well adapted to a typical development of the efflorescence. There was a return to the normal temperature on the fourteenth day. The highest temperature was 103.5° F. (39.7° C.).

Diagnosis.—William Squire, of London, Jan. 4¹⁰⁷⁷, in some clinical observations on the diagnosis of scarlet fever from measles and rötheln, emphasizes the fact that the deeper lymphatic glands at the angle of the jaw are always noticeable in scarlet fever; they may sometimes be rather full in catarrhal sore throat, in both rubeola and rötheln, and also in tonsillitis and influenza; but it is only in scarlet fever and diphtheria that they present a peculiar

tension and fullness; this is often exaggerated to a high degree in the more-severe cases, and may lead to suppuration in and around them. These glands are always to be felt in scarlet fever, and the superficial ones but seldom, and then from accidental causes; so that their absence in the early stage of eruption almost excludes the two rubeloid exanthems. A later and conclusive distinction, when found, of scarlet fever and diphtheria from measles and rötheln, is albuminuria. So rare is this as a sequela of measles that only once after exceptional chill in a convalescent, and once as a temporary symptom after anuria at the crisis, has the author ever known it to occur; never after or with rötheln. After slight sore throat and short febrile disturbance with no signs of desquamation, albuminuria more frequently points to a passed attack of diphtheria than of scarlet fever. The author believes, in doubtful cases with mild symptoms, that it is better to maintain the doubt until three weeks are over, when, if neither albuminuria nor any sign of desquamation are discernible, scarlet fever may be excluded. Even then it is better that the convalescent should continue to reside with friends, or in the care of members of their own family, for another three weeks.

John S. Davis, of Chicago,¹⁹² has noticed an odor emanating from the body of scarlet-fever patients which resembles that of old cheese, while in the case of measles the odor is sweetish until the decline of the eruption, when it becomes somewhat sour.

Kirkpatrick, of Montreal,²⁸² considers the diagnosis of the rash difficult when the cases are first seen by artificial light. John William Moore, of Dublin,¹⁶ reports a case where an axillary abscess in a nursing infant, 2 weeks old, simulated scarlet fever. The author remarks that the susceptibility of infants under 6 months to scarlet fever is so slight that a diagnosis of the disease, in so young a child, should be received with caution, if not with skepticism. In this connection he cites the case of a woman who developed scarlet fever while nursing her baby. The question at once arose whether mother and child should be separated. As the mother's supply of milk was abundant, Moore advised that she should continue to nurse her infant, because she would be relieved from all trouble with her breasts and from the excitement attending separation, while the infant would run little or no risk. Throughout the mother's illness she continued to nurse, and the

child escaped the disease. Some years afterward he pursued a similar course under analogous circumstances, and with equally good results.

A. B. Duffin, of London,¹⁰⁷⁷ Apr. 5 refers to cases of retarded rash with head symptoms, and the malignant forms which suggest acute meningitis. To differentiate these we must consider the intensity of the onset and the high temperature; meningitis may exist with a temperature of 101° to 102° F. (38.3° to 38.9° C.); and, if we look for it, we shall generally find some trace, at any rate, of a throat affection.

J. H. Heaney, of London, ² Oct. 1, '92 reports a case of syphilis which simulated scarlet fever. The patient, aged 22, was taken suddenly ill with vomiting, sore throat; rash on neck, trunk, and limbs; his temperature was 104° F. (40° C.). On examination the rash could not with certainty be distinguished from that of scarlet fever. The face, however, was thin and pale, there was no noticeable swelling beneath the jaws, and distress was not so accentuated as it usually is during the invasion of scarlet fever. It was found, moreover, that the sore throat had existed for a week. On careful search the initial lesion was found under the prepuce, and in the groins were the characteristic syphilitic buboes. One grain (0.065 gramme) of calomel was prescribed. In twenty-four hours the rash had almost disappeared, and the temperature reached 99° F. (37.2° C.).

Prophylaxis.—Basing his ideas upon a knowledge of the antiseptic value of hydronaphthol, which is equivalent to one-fifth of the same quantity of corrosive sublimate, and upon the fact that the latter remedy, if used for any length of time, has a tendency to produce ptyalism, E. P. Hershey, of Denver,⁹ Apr. 22 has used a 15-percent. hydronaphthol soap, daily washing with which caused earlier desquamation and prevented contagion. Until assurance had been established as to the efficacy of this after-treatment, a certain amount of care was taken to prevent other members of the family from coming into contact with the convalescent. A number of cases since then have been permitted to mingle with other children during desquamation, as long as the soap was used, and a single case has yet to be noted in which such exposure has led to the development of the disease. The use of such an antiseptic soap insures, first, the absolute contact of the medicament, on account

of the rubbing; second, the washing away and, at the same time, the disinfection of the loose particles; third, that the surface is left clean. In the early days of desquamation two or three washings daily should be required. After a period of one week daily washings suffice. This should be continued for ten days longer, at which time all signs of desquamation have disappeared, if this treatment has been adhered to.

Jamieson, of Edinburgh,⁸⁴⁵ gives four points which he believes require consideration in this connection: (1) the course of the infectious principle of scarlet fever; (2) the treatment of the throat and mucous membranes; (3) the management of the skin; (4) the value of "so-called" complete isolation, as compared with anti-septic measures and restricted isolation. The author advises, as the best application to the throat, a spray of hydrogen peroxide, using the 10-volume strength, repeated from three times daily to once in two hours, according to the severity of the case, and continued till all redness and swelling, other than that normal to the patient, have disappeared, and till its application no longer induces pain. Less efficient, but useful, is painting with a saturated solution of boric acid or of boroglyceride in glycerin, to which from 10 to 15 grains (0.65 to 1.00 gramme) of cocaine hydrochlorate in the ounce (30 grammes) may be added if pain or uneasiness in the throat be complained of. In some cases, chiefly those complicated with diphtheria, a tent-bed and the use of a steam-kettle afford great relief, and appear to be distinctly curative. It is, however, the steam, and not any antiseptic inhaled with it, which has a good effect.

The troublesome naso-pharyngeal catarrh, seldom seen except in children, needs syringing with a warm solution of common salt, 2 drachms (8 grammes) to the pint (500 grammes) of water, with $\frac{1}{2}$ drachm (2 grammes) of boric acid. This may be repeated twice, or more frequently, in the day; the nostrils being carefully dried with a pledget of absorbent cotton, and a little cold cream, to which 2 per cent. of salicylic acid has been added, gently applied inside of each nostril.

The care of the skin is of more consequence as regards the communication of the disease. In the stage of the exanthem the development of the rash is to be favored by warm baths, best given at night; in adults they may have to be replaced by tepid sponging. After the bath at night, the entire surface must be

smeared with some oleaginous substance containing an antiseptic; 1 drachm (4 grammes) of carbolic acid and 2 to 4 drachms (8 to 16 grammes) of eucalyptus-globulus oil in 8 ounces (250 grammes) of sweet-almond or olive-oil is sufficient, if well rubbed in night and morning. As soon as distinct evidence of peeling manifests itself, the simple warm bath, or tepid sponging, must be supplemented by the addition of a soap which will aid epidermic exfoliation. The one most suitable, and which fulfills all indications without the least injury to the patient, has been formulated by Eichhoff, of Elberfeld. It is a superfatted, hard soap containing 3 per cent. of resorcin and 3 per cent. of salicylic acid, and is made by Mielek, of Hamburg, and by Muhlens, of Cologne. The best method of using this soap is as follows: Some of it is rubbed on to a piece of wet flannel, and this is then used to wash the entire body, the scalp excepted, unless the hair has been shaved. It is sufficient to wash the body once daily, but the palms and soles can be washed twice; the inunction with the medicated antiseptic oil is continued twice a day, as before, the scalp being now specially attended to, when not washed. Under this treatment desquamation is completed in all cases in less than six weeks, the activity of the virus is diminished, the scales are removed by washing as they become loose,—nay, more, their separation is promoted,—and they are cast off in a feebly-infective or non-infective condition. No precaution found to be useful, however, should be omitted. A wet sheet dipped in carbolic solution should be hung before the door of the sick-room. The nurse ought to wear a cotton wrapper or overall, which can be laid aside when she leaves the apartment, and all bed- and body-linen should be immersed in carbolic solution before being taken from the room.

E. F. Brush, of Mount Vernon, N. Y., ⁶¹ recommends, as a prophylactic measure with children unaffected, but exposed to contagion, that the skin and entire body be anointed with a weak solution of carbolic acid in olive- or cotton-seed-oil, morning and night, and a gargle composed of $\frac{1}{2}$ ounce (15 grammes) of fluid hydrastis in a tumblerful of water, used three or four times daily. He believes the site of all the exanthems to be the skin, and sometimes the mucous membrane lining the upper air-passages, and hence the measures suggested.

A. S. Ashmead, of New York, ¹ June 10, has made some experi-

ments in the way of inoculations, in the hope of obtaining a protective virus against scarlet fever. His results have been negative hitherto, but he intends to make some further researches in the same direction. He recently inoculated two children, who had been exposed to the contagion of scarlet fever, with the blood-serum from a blister on the body of a child who, having previously had scarlet fever, might be considered as artificially immune against that disease. No scarlet fever occurred in those cases.

Treatment.—At the annual meeting of the Pennsylvania State Medical Society, W. C. Hollopeter, of Philadelphia,^{June 10}⁶¹ read a paper on this subject. He believes that great progress has been made in the prevention of sequelæ and of the spread of the disease. His method²³⁴ of conducting a case is briefly as follows: Isolate, in an upper room, all cases of scarlet fever the moment a diagnosis has been made. The room should be stripped of all possible hangings and superfluous furniture, and it should be large and well ventilated. No unnecessary visiting should be permitted. The nurse, whether a member of the family or otherwise, should wear a washable dress, and should not mingle with the family unless the clothing be changed or thoroughly disinfected. Should the case be severe and involve the throat, the gas or a small alcohol-lamp should be kept burning, in order that water may be boiled and steam constantly generated. Carbolic acid or oil of eucalyptus should be frequently added to the boiling water; this saturates the room very pleasantly, and at the same time, the author believes, limits the extent of the contagion. The patient should be thoroughly sponged with tepid salt water, or carbolized water (1 part to 60), or sublimate solution (1 to 8000), or alcohol and water, at a temperature of 70° to 100° F. (21.1° to 37.8° C.), three or four times a day, if the temperature should require it. Immediately following the sponging process the author orders the inunctions, which consist of cosmolin, menthol, and carbolic acid, 10 grains (0.65 gramme) of the latter to 1 ounce (30 grammes) of cosmolin, after the plan of J. Lewis Smith. This combination is exceedingly agreeable to the surface, brings comfort and ease to the patient, and at the same time protects the sensitive surface. Carbolized water (1 to 40), thoroughly shaken, may be used to sponge the surface, and may be agreeably followed up by cacao-butter.

A point mentioned is in regard to the proper disinfection of

the physician himself, which is frequently neglected. It is unwise for him to visit other cases, children especially, without protecting himself as well as others. He should invariably generate chlorine gas and allow it to go through his clothes thoroughly before he visits other families. This simple process is accomplished in a few minutes by placing a drachm (4 grammes) of powdered chlorate of potassium in a saucer and adding a similar quantity of hydrochloric acid; this is placed on the floor, and the physician stands over the vapor of chlorine as it arises until it penetrates all his clothing; then, with the free use of the whisk and a thorough hand-washing, he may feel that he is clean enough to enter home or any sick-room non-contagious.

In regard to the strictly internal medication, the author prefers phenacetin for older children, combined with quinine, in capsules. Acetanilid for younger children. He generally gives one-half as many grains as there are years in the child's life. When medicine can be exhibited in the form of capsules he always prefers to combine it with quinine to overcome the tendency to depression. Phenacetin and acetanilid act charmingly in controlling the nervous element, relieving headache and fever, promoting dia-phoresis, and inducing refreshing sleep. Acetanilid acts much quicker than phenacetin, but its effects are much shorter. It is, therefore, preferable for young children if exhibited in the form of a powder. If the bowels should be torpid, combine with the acetanilid small doses of calomel and soda. He has found it absolutely necessary, if he wished to see his case fully recover without any unpleasant after-results, to commence at once, in the early history of the case, to give careful and constant attention to the nose and throat, thus preventing much trouble and danger later on. He instructs the attendant to use a small atomizer filled with warm water containing bicarbonate of soda in solution, about 20 grains (1.3 grammes) to the ounce (30 grammes). If decided inflammation should occur, use a solution of peroxide of hydrogen, 1 part to 5 of cool water or glycerin, and follow it with an oily preparation, such as liquid albolin containing menthol, a 5-per-cent. solution. There is a most excellent combination called Blandin compound, in reality Dobell's tablets, and which has the advantage over the aqueous solution in that the antiseptic remedies are in an oily solution and are more soothing to the inflamed surface.

If the patient cannot tolerate an atomizer, frequently make the application of the antiseptic oil by means of an aluminium applicator direct to the posterior nasal spaces. A thoroughly faithful attention to the removal of the secretion of the nose and throat will prevent accumulation, and hence prevent regurgitation up the Eustachian tube, with all its associated ear troubles. In this way he is sure diphtheria can be prevented from gaining its first lodgment, and, if it gain any at all, little trouble is experienced with this dreaded disease. The already-inflamed surface must be kept thoroughly aseptic. If, however, pain in the ear should indicate the extension of the trouble up the Eustachian tube, we must redouble our efforts. The desquamation within the Eustachian tube itself may be quite beyond the reach of our detergent wash.

The external auditory canal may also become blocked by desquamating epithelium, and this must be removed by gently sponging it out. The crude method of dropping laudanum and sweet-oil in the ears is to be condemned, as it serves as a nidus for the collection of dust and dirt, independent of the rapid accumulation of dead epidermis. Since the author has given careful attention to the management of nose, throat, and ears, as explained above, he has had but little diphtheria complicating his scarlet fever, and rarely otitis to confront him, later on, as unpleasant sequelæ.

Scarlatinal rheumatism has been encountered by Hollopetter in but a small proportion of his cases, and then it was of a transient character, leaving no damaged heart-valves behind. He is inclined to attribute this fortunate result to the faithful use of daily bathing and inunctions, long continued, or at least until after completion of desquamation.

The specific poison of scarlet fever is peculiarly obnoxious to the kidneys. It is largely eliminated through them, and here hinges the scientific part of the treatment of this disease; the more active we keep the skin, the less danger is likely to occur to the kidney. If the urine is examined throughout the whole course of the disease, we shall find, in the earlier stage, that it grows less, and becomes more laden with the waste of the body, at times nearly suppressed by mechanical blocking of the uriniferous tubules. If, now, the skin is not invited to act to its fullest extent, we shall soon find our patient reduced to a comatose state. Free

bathing has the happy effect of vicariously eliminating, and removes the undue pressure placed upon the kidneys. A milk or, at least, a fluid diet should be used. It is, the author says, unscientific treatment to exhibit digitalis in any form during this stage, without taking into consideration the pathological condition. By unloading the effete material through the skin or bowels, the damaged kidney will be relieved. The infusion of digitalis is indicated later on, when the kidney commences to act.

In the discussion of the above paper, Hare, of Philadelphia, ⁶¹_{June 10}, stated that he fully indorsed sponging and carbolic inunctions; the temperature falls under their use. Mild, alkaline diuretics, spirits of nitre, and acetate of potash he found of value. Acetanilid, however, he considered dangerous, and needed care in its use. Tyson, of Philadelphia, ⁶¹_{June 10}, advised digitalis; in small doses, he believed that it prevented nephritis. He had ceased the use of the coal-tar derivatives.

F. W. Bartlett, of Buffalo, ¹⁷⁰_{Sept.} urges the employment of entero-clysis with sublimate solution (1-16000 to 1-8000), commencing after the eighth day, or sooner, if there be diarrhoea.

J. B. Curgenven, of London, ²_{Feb.} advises inunction of the patient with a special preparation of eucalyptus-oil, twice daily for the first three days of the illness, and then once a day for another week, the same preparation being used freely about the bed and room generally. At the end of that time, he claims, the patient may mix with his fellows without any risk of conveying infection.

E. P. Hershey, of Denver, ⁹_{Apr. 22} insists on having the throat cleansed often,—every half-hour,—and gives throughout the whole affection digitalis and other diuretics, to guard against nephritis. The danger of heart-complication he averts by the timely and continued use of ammonium carbonate.

E. M. Cheever, of Greenfield, N. H., ⁵¹⁷_{Mar.} prescribes whisky from the commencement of the disease until the end of the first week. He gives from 1 to 4 teaspoonfuls, every hour, to a child 2 or 3 years old, carefully observing its effect.

MEASLES.

Incubation.—From the observation of seventy-nine cases in an institution, W. F. Lockwood, of Baltimore, Md., ⁵¹_{June}, concludes that the incubation of measles is almost uniformly thirteen or fourteen days.

J. G. Carstairs, of Geelong, Australia, ²⁸⁵ July 15 believes that the range of variation is greater than in some other infectious diseases, and in several hundred cases found the period to be from twelve to eighteen days.

Symptomatology.—J. G. Carstairs ²⁸⁵ July 15 states that the initial fever, or catarrhal stage, varies to an equal extent with the incubation period; thus, out of 193 cases in which this was noted, 12 had no premonitory symptoms, the rash being the first sign of illness, 41 were affected only one day, 29 two days, 55 three days, 35 four days, and 21 from five days to a week before the eruption appeared. In one case there was a period of three days of giddiness, with a subnormal temperature, followed by a measles rash. W. F. Lockwood, Baltimore, ⁵¹ June believes that the early vomiting and diarrhoea are due mainly to accidental and extraneous causes.

C. J. Edgar, of Sherbrooke, Can., ¹³⁰ Dec., '92 records an epidemic of 423 cases. Of these, only 123 were of the regular type; 103 cases were of the malignant type, complicated with some other disease, and furnished 7 of the fatal cases. The remaining 200 cases were of the haemorrhagic form, and were less violent than the former ones. The only symptoms which were present in absolutely all the cases, of whatever type, were rise of temperature and eruption. The catarrhal symptoms were entirely absent in about 5 per cent. of the cases. The mouth-rashes of Guersant and Blache and of Girard were present in only about 25 per cent. The initial stage in this epidemic was very prolonged, ranging from four to fourteen days, the average being about six. The eruption, of whatever type, appeared first on the face and in almost every case was plainly visible under the skin for from six to forty-eight hours before its appearance as a distinct rash. In 200 cases of the haemorrhagic type—in which the spots were of a more or less livid hue with ecchymoses of various sizes and shapes—slight haemorrhages from the mucous cavities were very common. Almost all the adult females menstruated during the attack, and three female children, aged, respectively, 3, 7, and 9, had a similar discharge from the genitals. Epistaxis was most common, but haemoptysis and discharge of blood from the rectum and the bladder were not rare. In five cases, before the eruption appeared, the patients became for two days literally black and livid all over; they had exactly the appearance of suffering from extreme asphyx-

iation, but there was no trouble in breathing and no particular lung symptoms. These latter patients were of dark complexion, and, although the cases were severe, they were not fatal and did not differ otherwise in appearance from hundreds of others. The rash in the haemorrhagic cases lasted very much longer than in the other varieties.

Complications.—Mussy, of Paris, ²¹²_{Apr. 10} calls attention to an infectious erythema following the eruption (two to sixteen days), generally observed in cases complicated with purulent bronchitis or broncho-pneumonia with infection by streptococci. The erythema is of polymorphous character, usually resembling that of scarlatina, but in three cases it was purpuric. When associated with broncho-pneumonia, death was very rapid. V. Hutinel and Paul Claisse, of Paris, ⁹²_{May 10} have previously called attention to this manifestation of subacute septicæmic infection in very young children. They attribute it to infection by streptococci. A. Brothers, of New York, ¹¹_{May} has observed that laryngeal cough, due to punctate spots and shallow ulcers in the air-passages, is very common. The symptoms suggest the diagnosis of croup. Genuine diphtheria has been met with in measles so often that the author cannot consider it extremely rare. Juhel-Rénoy, of Paris, ¹⁴_{Mar. 12} reports a case of concurrent enteric fever and measles. This case would seem to oppose the theory of Trousseau—that a patient having one of the severe fevers is preserved against attacks of any other fever during its existence.

V. Poulet, of Plancher-les-Mines, ⁶⁷_{Aug. 30} has observed the co-existence of influenza with measles and scarlatina, and, more frequently, concurrent scarlatina and measles. The latter combination has also been observed by Noeldecher, of Naumberg, ⁴¹_{Mar. 13} who considers it due to double infection. W F. Lockwood, of Baltimore, ⁵¹_{June} considers it of importance to distinguish between the complications croupous and broncho-pneumonia, touching the gravity of the prognosis. He calls attention to the fact that a rapidly-fatal so-called pseudodiphtheria may supervene without affording any certain diagnostic clinical sign.

C. J. Edgar, of Sherbrooke, Canada, ¹³⁰_{Dec. 92} in reporting an epidemic of four hundred and twenty-three cases, remarks that in all of the really severe cases there was some complication present—bronchitis being the most frequent and pneumonia the most fatal.

Some authors state that when a pulmonary complication begins in the prodromic stage it almost always modifies the eruption in some manner, either retarding it or rendering it irregular or imperfect; and that when it dates from the second stage it may cause a partial or complete retrocession of the eruption. This was not the fact in the epidemic reported by Edgar, for in none of the complicated cases did the rash disappear or become markedly irregular. The only other complication sufficiently constant to show connection with the disease was intestinal inflammation, notably entero-colitis in children, and this might possibly be explained by the appearance of the epidemic during the hot season. Two rather mild cases were complicated with pregnancy, but without untoward result. Convulsions occurred in the prodromic stage in ten cases, but were not protracted, and all disappeared as the disease became established. No case of meningitis occurred. O. O. Graf, of Indianapolis,⁵⁶ _{Dec., '92} records an instance of paralysis accompanying measles. The paralysis developed while the fever was at its acme and disappeared during convalescence.

Sequelæ.—Hutchinson, of London,⁸⁰⁶ _{Oct., '92} reports a papular eruption, of long persistence and with a tendency to gangrene, following measles in a young infant. He does not claim that the measles eruption became gangrenous, but believes, rather, that the previous occurrence of measles gave peculiarity to the morbid processes, rendering them more prone to molecular gangrene. J. P. Crozer Griffith, of Philadelphia,⁵¹ _{June} noted a case in which ulcerative vulvitis followed measles in a child $3\frac{1}{2}$ years old. The case was interesting because of the extent and severity of the ulceration and because it appeared to occupy a middle ground between slight ulceration and true noma. The process involved the labia majora, the posterior commissure and fossa navicularis, the perineum and anus, and apparently extended also into the rectum. D. Burgess, of Sheffield, Eng.,²² _{May 31} gives the history of a case in which hypertrophic or biliary cirrhosis of the liver followed an attack of measles in a girl aged 4 years.

L. Emmett Holt, of New York,² _{Mar. 18} states that, of one hundred and forty-three cases of measles observed by him, three cases were followed by tuberculous disease. Holt believes that the explanation of this frequency is to be found not in increased susceptibility, but in the existence of latent tuberculosis in the bronchial

glands, an acute process being set up by the measles in the glands, and extending thence to the lungs.

Recurrence.—Diamantberger, of Paris, ²⁴_{May 14} reported the case of a child, 2½ years of age, in whom a second attack of measles occurred after an interval of eight months. The recurrent disease was accompanied by a severe broncho-pneumonia and terminated in death. The patient was rachitic, and contracted the disease a second time from his brother. This second attack of measles followed almost immediately upon an infectious pneumonia. The author was of the opinion that the previous existence of an inflammatory condition of the air-passages had prepared the soil for the second invasion of the specific contagium of measles. The etiological details of this case suggested to the author an additional prophylactic precaution, viz., that every patient, although he may have had measles, should be removed from contaminated surroundings if he be suffering from any inflammatory condition of the air-passages, as simple or tuberculous bronchitis, broncho-pneumonia, pneumonia, and even from a pharyngeal, laryngeal, or naso-buccal affection. Beauvais, of Paris, ¹⁴_{May 7}, and W. Streng ²⁹⁷_{May 21} report similar cases. Duchesne ¹_{Mar. 18} cited the case of a man, 42 years old, who had three well-marked attacks of measles within the space of two years. In the discussion following the report of the latter case Dignat recalled one where two attacks occurred at an interval of eleven months.

Prenatal Measles.—F. B. Robinson, of Chicago, ¹_{May 15} notes an interesting case of prenatal measles. He was called to a woman in confinement. On arriving at the house he found the child just born. It was an eight months' child. The mother was then in the stage of full eruption of an active attack of measles. The child's body was covered with as severe a rash of measles as he had ever witnessed. The body was very red, and the eruption was as distinct as it was on the mother. The labor was premature and the measles eruption no doubt induced endometritis and consequent expulsion of the child. Mother and child recovered without any untoward events. F. B. Philpott, of Salisbury, Mo., ¹_{May 27} reports a similar case.

Measles in Adults.—J. G. Carstairs, of Geelong, Australia, ²⁸⁵_{July 15} observed twenty-three cases of measles in adults during an epidemic. Another case, reported by Duchesne, ¹_{Mar. 18} is mentioned in

the previous section. Favier²⁶ describes a variety of measles which occurred as an epidemic in a regiment stationed at Maubeuge, as follows: At the commencement prodromata were absent and there was no pyrexia. In almost every case there was a slight angina with a moderate nasal and ocular catarrh and slight cough without stethoscopic signs. This period lasted from one to three days, when the eruption appeared. It consisted of very abundant spots, sometimes confluent and sometimes papulous; the diameter of the spots was about that of a lentil, and the color a vinous red. The spots disappeared on pressure. The eruption was most marked on the face, arms, and body, diminishing from the waist downward, and absent in the legs. It was not found in the mucous membrane of the mouth, lasted twenty-four hours, and entirely disappeared on the third day. There was no desquamation. The spots occasionally rested on an erythematous or scarlatiniform base. The temperature did not exceed 38.6° C. (101.5° F.), and was sometimes normal. The highest temperature corresponded with the maximum intensity of the rash. The duration of the febrile stage did not exceed four days. The incubation period seemed to be about fifteen days, and the disease was unquestionably infectious.

Treatment.—L. Emmett Holt, of New York, ^{Mar. 18} states that he believes life was prolonged in two or three cases of measles by means of *gavage*, or forced feeding, one infant making a good recovery. In a few instances of hyperpyrexia, cold baths or cold packs were used and no unfavorable symptoms were attributed to them. In cases with cyanosis, high temperature, and great dyspnœa, hot mustard baths and mustard to the entire body seemed to be more serviceable than any other means used. Hollopeter⁷⁶⁰ _{Oct. 29, '92} suggests the following treatment: tepid (warm) bath; temperature of room kept at 65° to 70° F. (15.5° to 21.1° C.); the room darkened to protect the eyes; anointment of the entire body with cacao-butter to ease the itching. Internally, he prescribes: Rx Acetanilidi, gr. xij (0.77 gramme); hydrarg. cum cretæ, gr. iij (0.20 gramme); sacchari, q. s. M. Sig.: Take at once. If bronchial catarrh set in, he gives: Rx Potassii citratis, 3j (4 grammes); succi limonis, tinct. opii camph., syrapi ipecac., syrapi tolutani, aa 3iv (15.5 grammes). M. Sig.: A teaspoonful as needed. Inunctions with simple or antiseptic ointments are advised by many writers. R. D. Patterson², _{July} recommends the use

of "oleusaban" (an oily preparation of eucalyptus globulus) every morning, after a sponge-bath, until convalescence.

Hugh Thomson, of Glasgow, ^{Apr. 5}, has inoculated children with fresh serum taken from blisters on patients suffering from measles. Out of 8 cases, 4 appear to have been successful in preventing the disease, 2 in modifying the attack when inoculation was performed during the incubative stage, and 2 failed. In these last 2 cases, as the local effects were unusually slight, it is possible that the matter was too weak.

VARICELLA.

Incubation.—Talamon, of Paris, ³¹, Jan. 29 fixes the period of incubation at fourteen days. J. J. Eyre, of Beckenham, ², Dec. 31, '92 in one case, and P. R. Dennehy, of Lismore, ², Jan. 21 in four cases, reach the same conclusion, but A. Gouget, of Paris, ¹¹⁸, Mar. quotes a case of Steiner's in which it was eight days, and another of d'Heilly's in which it was only three days; in two cases, under his own observation, Gouget fixed it at four days.

Complications.—E. Jahn, of Rappoltsweiler, ⁴¹, June 1 reports the case of his daughter, in whom vaccinia and varicella appeared concurrently. J. G. Gornall, of Warrington, Eng., ², Feb. 11 reports a similar case. The eruption in the latter case, in the suppurative stage, could in no way be distinguished from that of small-pox; the general symptoms were very mild. J. T. C. Nash, of Beckenham, ², Dec. 31, '92 reports a case under his care in a child, 3½ years old, in whom were developed, within a week, the following infectious diseases, in the order named: whooping-cough, varicella, and measles. J. Thomson, of Edinburgh, ⁵¹, Aug. reports a case of coincident measles and varicella rashes.

Sequelæ.—Louis Schwab, of Cincinnati, ⁵³, Dec. 31, '92 reports two cases in which nephritis followed varicella. Cassel ⁶⁰, Aug. 10 reports a similar one. C. Pesa, ⁵⁸⁹, Nov. 2, '92 in twenty-six cases of varicella, has observed nephritis as a sequela in two of them; in three others there was extensive gangrenous ulceration of the skin, in another grave cystitis and intense stomatitis, and in another noma. Marfan ¹⁴, Mar. 12 reports a case of spinal paralysis and otitis media following varicella in a tuberculous child. J. Girode ¹¹⁸, Aug. notes a case of varicella, followed by pseudomembranous angina and orchitis, produced through infection by streptococci.

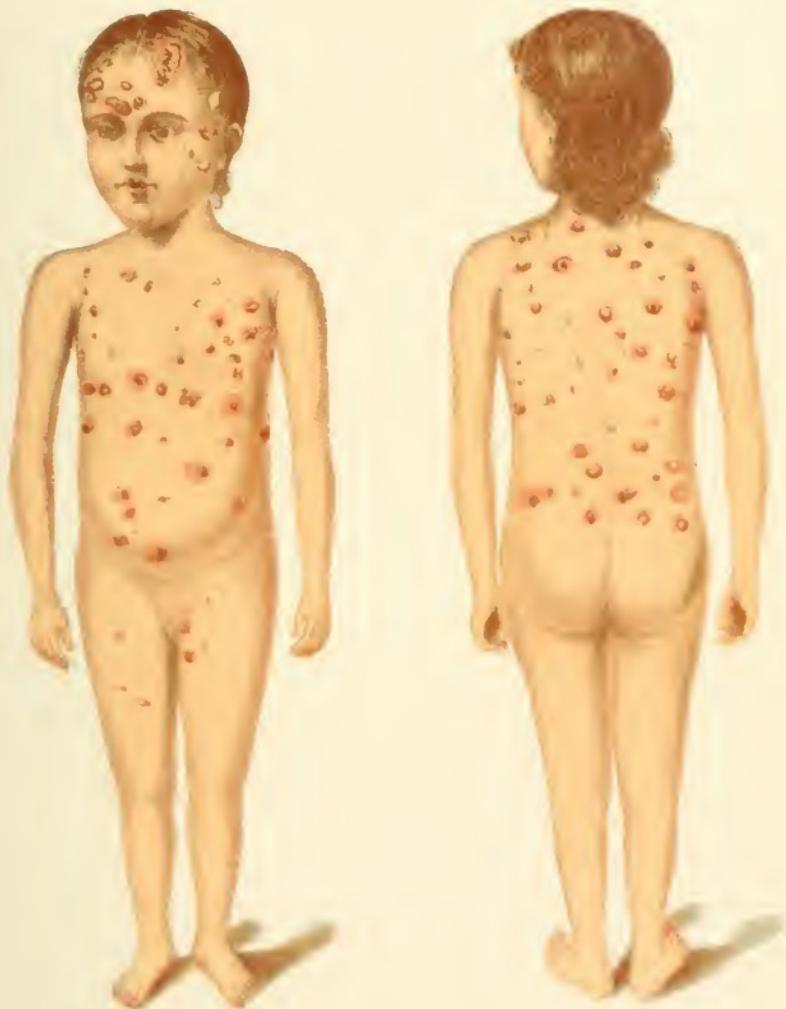
The cases of gangrenous ulceration of the skin recall a case

reported by Hutchinson, of London, ⁸⁰⁶_{Apr., '92}, and named by him "varicella gangrenosa." In the accompanying plate is shown the back and front view of the patient. It must be taken as indicating the distribution of the eruption and its relative severity in different parts. It will be seen that it affects the face most severely and not the trunk, the extremities being almost exempt. The patient was a girl aged $2\frac{1}{2}$ years. She made a good recovery. It will be noticed that on many of the varicella-spots a portion of the skin has sloughed and become black; in others the condition is one rather of necrotic ulceration than actual sphacelus.

RÖTHELN (RUBELLA—GERMAN MEASLES).

Diagnosis.—The appearance of a number of papers during the year affirming the identity of this disease with the ordinary form of measles would seem to indicate that the medical profession are far from being a unit in according to rötheln an existence as a separate and distinct disease. At a meeting of the Royal Medical and Chirurgical Society Donald Hood, of London, ²²_{Mar. '22} undertook the task of propounding a scientific explanation of the belief as to the identity of rötheln with measles. His arguments may be summarized as follows: He assumes that rötheln is a modified form of measles in which the contagium has undergone an evolutionary modification in consequence of profound alterations in the soil and conditions of environment. To explain the fact that an attack of rötheln does not confer immunity against measles he supposes that rötheln, being a milder form of the disease, might not confer the protection afforded by a previous attack of measles of average severity.

An editorial ²²_{Mar. '22} pertinently observes that the latter supposition clashes with all our notions of immunity by attenuated virus. In other diseases inoculation with an attenuated virus protects against the severer forms of the disease,—and, under any circumstances, the hypothesis would not explain why an attack of measles does not protect against rötheln. Clinical evidence, on the other hand, is altogether in favor of the two diseases being quite distinct. Other papers on this interesting question are published by F. P. Atkinson, of Surbiton, Eng. ⁶_{Sept. '22}; H. Gillet, of Paris ¹¹⁸_{Jan., Feb.}; Meredith, of Wellington, Eng. ⁶_{July '22}; William Squire, of London ¹⁰⁷⁷_{Jan. '4}; Flatten, of Wilhelmshaven ²⁵²_{No. 1}; and Chas. P. Putnam, of Boston. ⁹⁹_{July '13}



Varicella Venerosa. Richardson.
Anatomical Drawing.

RHEUMATISM AND GOUT.

BY N. S. DAVIS, M.D., LL.D.,
CHICAGO.

ACUTE AND CHRONIC RHEUMATISM.

Etiology.—William Henry Porter, of New York,^{814 Jan.} in discussing the nature and causes of rheumatism, claims that lactic acid is the direct cause of the active symptoms, and that an excess of this acid is generally produced by eating too freely of food containing a large percentage of starch and sugar or proteids, and thereby introducing more than can be completely oxidated. By such incomplete oxidation of the proteid compounds within the system, he says, “the percentage of urea in the urine falls, uric acid increases, and lactic acid appears in large quantities; and to this might yet be added a long list of other by-products. But it is the lactic acid that chiefly appears in rheumatic affections.”

He thus makes the suboxidation of proteid compounds in the metabolic processes of assimilation, whereby the formation of an excess of lactic acid is produced, the chief factor in the etiology of rheumatism. C. E. Fowler, of Sacramento, Cal.,^{147 Aug.} indorses the views of Porter regarding the “dietetic” etiology of rheumatism, as stated above.

J. Mussy, of Paris, ^{31 Dec. 10, 92} under the head of “Barlow’s Disease,” calls attention to cases in infants characterized by acute pains in the limbs, especially in the direction of the long bones; frequent gastric derangements; leaden hue of the surface, with occasional œdema of the extremities, and haemorrhagic spots. It was suggested that the morbid conditions had been caused by defective alimentation.

J. Robin, of Paris, ^{188 May 25} relates an interesting case of rheumatismal œdema, which he attributes to lesions of the terminal ganglionic nerve-centres, and designates the disease “pseudo-elephantiasis neuro-arthritis.” Bengue, of Paris, ^{55 Dec. 10, 92} says that the œdema complicating rheumatism arises from trophic lesions,

and may affect the formation of pseudo-phlegmons, pseudo-lipomas, and rheumatismal nodes.

Vack²¹³ gives an interesting account of two severe cases of acute dysentery with articular rheumatism. The first was characterized during the early stage by high temperature and very frequent discharges (from one hundred and fifty to two hundred per day) of mucus and blood, with much tenesmus. Both cases ran a protracted course, and were accompanied by great emaciation and muscular atrophy. Catrin¹⁴ June 25 gives a summary of four cases of rheumatismal mumps with endocarditis. He says that the attack of the parotid rarely occurs as a primary location, but is generally preceded by development in some of the articulations. Moutet²⁴³ June gives a very interesting history of a case of rheumatismal insanity, complicated with subacute articular rheumatism and endocarditis. The mental derangement was protracted, and passed successively through the stages of mania, melancholia, and dementia to ultimate recovery. Sahli,⁶ July 22 in a paper favoring the infectious nature of acute articular rheumatism, relates the case of a girl, aged 16 years, who died in a second attack, and from whose endocardial excrencences, pericardium, pleura, bronchial glands, and synovial membrane, he obtained a staphylococcus resembling, if not identical with, the staphylococcus citreus. But his attempts to inoculate rabbits and guinea-pigs with the virus or microbe failed. Lucatello, of Genoa,⁶ Dec. 192 at a recent medical congress in Italy, showed cultures, at different periods of growth, of a micro-organism which he had isolated in two cases of acute articular rheumatism. He found it in the blood, spleen, synovia of the knee-joint, and in an infiltrated ganglion. The microbe is small, round, staining with difficulty, not growing either in the air or in blood-plasma, and possessing no pyogenic or saprogenic properties. Yet he regards it as the microbe of rheumatism. Riva,¹⁵¹ Feb. in a paper on rheumatismal infection, concludes that if there is such an infection it must be through the micrococcus of Fraenkel; while his colleague, Gauldi, says that the infection is not contagious, and that the specific bacteria are not isolated.

Pathology and Pathological Anatomy.—According to Porter,⁸¹⁴ Jan. the lactic acid resulting from the suboxidation of proteids enters into combination with sodium and calcium salts, forming

compounds of difficult solubility, and by their precipitation or deposit in the tissues develop the local phenomena of rheumatism, which, when intense or extensive, results in reaction or rheumatic fever.

A. M. Edge, ² mentions a case, in the Manchester Southern Hospital, of a boy aged 8 years, who was admitted with subacute rheumatism in both wrists and some other joints, accompanied by numerous subcutaneous nodules. "About a dozen large and several smaller ones were found symmetrically distributed on each side of the spinal column, the largest being the size of a hazel-nut." Nodules were also found on the spines of the scapula, and on the upper extremities. There was no cardiac complication. Leo Ever ¹⁴⁷ describes chronic muscular rheumatism as an inflammation of the muscular fibres, accompanied by the formation of small nodules, which develop slowly at the expense of the muscular substance, and sometimes attain considerable size. He attributes much of the pain and muscular atrophy to the presence of these nodules. Massalongo ² claims that chronic articular rheumatism is a tropho-neurosis, due to dynamic or structural alterations of the ganglia of the anterior horns of the cord, similar to that which occurs in tabes dorsalis, syringomyelia, etc. J. Litinski ¹⁴ relates a case of rheumatism in the erico-thyroidian articulation, which rendered both phonation and deglutition very painful. He also refers to three cases reported by Simonovski to the Medical Society of St. Petersburg. All the cases were relieved by treatment with salicylate of sodium and iodide of potassium, with inhalation of emollient vapors.

Max Kahane ² relates five cases of muscular atrophy in connection with rheumatic polyarthritis, which he attributes to trophic or nerve influence, for which electrical and mechanical treatment proves most beneficial. F. E. Nichol ⁶ records the case of a female child, aged 7 years, suffering ten weeks or more from rheumatic pains and swelling in the knee and ankle, some endocarditis and chorea, in whom the head of the right femur was found dislocated upon the dorsum of the ilium. It was reduced with the aid of chloroform, dressed with proper splints, and the child made a good recovery.

Treatment.—H. K. Whitford, of Chicago, ¹⁹² treats acute rheumatic fever by giving 1 or 2 drops of tincture of aconite and 8

grains (0.50 grammes) of nitrate of potassium every three hours, well diluted in water, until the acute stage has passed; and then gives from 10 to 15 drops of tincture of chloride of iron every three hours to hasten the renewal of the haemoglobin, and thereby prevent the continuance of anaemia.

D. B. Hardenbergh, of New York, ^{50 July 29} reports ten cases of acute articular rheumatism, treated chiefly with salophen, given in 15-grain (1 gramme) doses from three to six times in the twenty-four hours. The average febrile period, after the exhibition of the drug, was six and one-ninth days; and the average period from admission to the hospital to date of discharge less than ten days. No unpleasant effects were produced by the medicine, and the cases developed no cardiac complications. I. J. Erlanger ^{21 Aug. 19} reports the successful treatment of twenty-five cases of articular rheumatism by the use of sodium salicylate in rectal enemata. He first causes the rectum to be completely emptied, and then injects through a large-sized catheter, passing up the rectum eight or ten inches, 10 minims (0.65 grammes) of tincture of opium to each drachm (4 grammes) of the salicylate used in solution. He thinks that the remedy is rapidly and completely absorbed, and that its therapeutic effects are rapidly developed. Hertel, Herzog, and Cohnheim are reported as having used the hydrochlorate of phenocoll in the treatment of articular rheumatism with success, when used to the amount of 5 grammes (1½ drachms) in twenty-four hours. They found smaller doses inefficient.

McCall Anderson, of Glasgow, ^{213 July} relates a case of rheumatism with well-marked cerebro-spinal symptoms successfully treated with 10-grain (0.65 grammes) doses of salicine every hour; after the first day the dose was increased to 20 grains (1.3 grammes) with a milk diet. Shiels, of San Francisco, ^{77 June} relates a case of transient insanity following the use of 20-grain (1.3 grammes) doses of sodium salicylate every two hours for rheumatism. The mental disturbance was relieved by potassium bromide. Bourget ^{194 July 20} claims to have treated several cases of acute articular rheumatism successfully by thorough application to the affected articulations of salicylic acid in the form of ointment, with lard, lanolin, and essence of turpentine. The absorption was sufficiently active to enable Bourget to detect the salicylic acid in the patient's urine at the end of twenty-four hours. Ruel, of Geneva, ^{197 Aug. 20} claims to

have used systematically, and with success, similar external applications of salicylic acid in rheumatism during the last six years. Bourget's formula for his ointment is: salicylic acid, lanolin, oil turpentine, each 10 parts, and lard 70 parts.

H. A. Hare⁵⁰ mentions several cases of rheumatic neuritis and myalgia, treated very satisfactorily with salophen in 10-grain (0.65 gramme) doses four times a day. Winternitz² _{Apr. 29} recommends the treatment of deformities resulting from severe chronic multiple rheumatic arthritis, by alternate applications of cold and warm water and massage, aided by faradic currents through the articulations, to lessen the morbid sensibility of the parts and render the massage less painful.

Douglas Graham, of Boston, ⁵ _{Aug.} in an article commending the use of massage in muscular rheumatism, states that recent cases "are almost invariably cured by a few massages," while in more chronic cases relief will be hastened by the addition of rest, warmth, and electricity. He further states "that when a case of apparent muscular rheumatism does not only yield, but also does not stay improved after a few massages, then the probability is that the case is one of neuritis affecting the nerve-fibres that supply the impaired muscles." He thus uses massage as a means of diagnosis between muscular rheumatism and neuritis. James Wood, of Brooklyn, N. Y., ⁹ _{Sept. 9} quotes the assertion that the virus of the bee-sting is an infallible remedy for acute rheumatism. ²⁰²⁶ _{Apr. 11}

Gonorrhœal Rheumatism.—R. Stanziale¹⁵² _{July 14} gives the results of his bacteriological and inoculation investigations concerning the effusions into the joints in a case of gonorrhœal rheumatism. The effusion from the affected articulation was found by him purely sero-fibrinous, and not purulent. No bacteria of any kind were found in either the serous effusion or in the blood of the neighboring parts. Inoculations with the exudation, both in animals and man, gave only negative results, which fully confirms the opinions of other observers, that the effusions in gonorrhœal rheumatism contain no specific toxins. Under the head of gonorrhœal rheumatism, J. W. Little, of Minneapolis, ¹⁰⁵ _{Mar. 15} relates a case of inflammation and suppuration in the elbow-joint in a patient affected with gonorrhœa. He properly says that such cases should be called gonorrhœal septicæmia, and not rheumatism. B. A. Rugg, ⁶ _{Oct. 1, '92} in relating a case of hyperpyrexia in connection with gonorrhœa,

terminating fatally, also claims such cases to be strictly septicæmic, and having nothing in common with ordinary rheumatism.

Treatment of Gonorrhœal Rheumatism.—In the ANNUAL for 1893 allusion is made to the successful treatment of a case of so-called gonorrhœal rheumatism by hypodermatic injections of bichloride of mercury, by L. Arnaud. This author ²⁴ _{Nov. 20, '92} has adduced further evidence of the efficacy of the practice in an inaugural thesis. He uses for the injection the following formula:—

Hydrarg. bichlorid.,	0.40 gramme (6 grains).
Sodii chlorid.,	1.00 gramme (15 grains).
Aqua destillatae,	100.00 grammes ($3\frac{1}{4}$ ounces).

C. B. Hutchins, of San Francisco, ¹⁸⁶ _{Jan.} says that the best treatment for gonorrhœal rheumatism "is wrapping the joint with a cloth saturated with a solution of bichloride of mercury, 4 grains (0.26 gramme) to the ounce (31 grammes), and surrounding the cloth with oiled silk." He claims rapid recoveries without internal treatment. On the other hand, A. M. Vance, of Louisville, Ky., ¹⁹ _{Apr. 1} and Will. B. Crawford, of Lexington, N. C., ¹⁸⁶ _{Nov. '92} recommend the protracted and liberal internal use of iodide of potassium, sometimes aided by bichloride of mercury and rest.

GOOUT.

Etiology and Pathology.—F. Arnaud, of Marseilles, ⁹⁹⁶ _{Jan. 25} in commenting on the work of Maxime Lejeune, of Paris, says that this author attributes the gout, or arthritis, to an acid diathesis, characterized by a diminished alkalinity of the blood, increased acidity of the urine, and insufficient organic oxidations, which lead to accumulations in the blood of toxic leucomaines acting like irritant poisons. In a clinical lecture, Frank Woodbury ⁶¹ _{Apr. 25} says: "Uric acid is not the cause of gout; it is the gout, on the contrary, which causes the excess of uric acid. In other words, the gouty diathesis, or condition, is that in which there is a tendency to increased formation of uric acid, and also of oxalates, and it is accompanied by other well-marked pathological occurrences which complete the clinical picture." At a meeting of the Berliner medicinische Gesellschaft, Biesenthal ⁴ _{Aug. 21} presented specimens of artificial gout in animals, produced by the use of chromic acid, and the effects of piperazin in preventing the same. Biesenthal had conducted his experiments with much care in the pathological institute

controlled by Virchow. The effects, both in regard to the rapid induction of uratic deposits in the tissues and their removal or prevention by the use of the piperazin, were very striking. Mendelsohn, however, claimed that the artificial disease produced in the animals was not identical with true gout. The essential point of the latter "was that the uric acid dissolved in the tissue-juices set up the anatomical changes, and not the solid uric acid deposited later." Biesenthal, in concluding the discussion, said that the preparations exhibited were taken from two animals which had been subjected to injections of chromic acid for five weeks. One had been given piperazin daily, and the tissues were free from deposits; while the other had taken none, and was filled with copious deposits of uric acid. Mabboux, of Contrexéville,²¹¹ Oct. 23, 192 relates a typical case of articular gout in a girl of only 11 years of age. F. G. Gardner, Tewkesbury,² Nov. 21, 192 illustrates the affinity of "Heberden's nodes" with gout by the case of an elderly woman who had well-marked multiple gout and Heberden's nodes on nearly all her "distal digital phalanges." Labadie-Lagrange¹⁷ Nov. 22-24, 192 gives an interesting discussion of the gout produced by lead, but adds little to what is already familiar in the literature of the subject. J. Vindevogel, of Brussels,⁶⁷³ Mar. says that "gout is a constitutional disease affecting the nervous system or vital forces, as well as the blood or the materials of organization"; and, he adds, "the presence of sodium biurate, as the *corpus delicti* of gout, is a consequence of incomplete combustion or a stoppage in the disassimilation of quaternary substances." J. Mortimer Granville²² Feb. 15-22, Mar. 1 reviews at length the prevalent chemical doctrine that uric acid or the biurates constitute the chief etiological factor in gout, and concludes by declaring that "Cullen was nearer the discovery of the secret than we now are, when he insisted that to the primary moving forces of the organism—namely, to the nervous system—the physician must look for the cause or causes of gout."

Treatment.—J. Mortimer Granville, as just quoted, not only refers more of the morbid actions in gout to the nervous system than to the chemical conditions of the blood or urine, but he recommends a greater variety of diet, and especially of meat or proteids; and for medicine he still prefers "iodine, pure and simple or in loose combination with a stimulant base, such as caffeine or guaranine." Vindevogel⁶⁷³ strongly recommends the use of

strychnine-colchicine, which, by the general dynamogenous power of the former, and by the special power of the latter in exciting the nervous elements and cells, actively increases disassimilation, exalts the power of the nervous system and more especially of the trophic centres. He also represents aconitine as exerting as direct a tonic effect on the cardiac ganglia and on the sympathetic system of nerves as strychnine does on the cerebro-spinal system. F. Grimm, of Berlin,¹⁷⁷ May claims the best results from giving fractional doses of calomel at the beginning of an attack of gout until it freely moves the bowels. It is specially recommended in cases preceded by constipation. T. Sydney Short, of London,³² Nov., '92 in a paper read before the Queen's College Medical Society, discusses at considerable length the dietetic treatment of gout and kindred affections. His paper contains a good summary of the prevalent doctrines concerning diet as deduced from the chemical theories of the nature of gout, but it evolves no new principle for our guidance. Edgar Moore Green, of Easton, Pa.,⁷⁸⁷ July in an address on medicine, before the Lehigh Valley Medical Association, gives a still more lengthy and interesting summary of prevalent doctrines concerning the nature and treatment of gout. Concerning treatment, he says that the diet should be moderately abstemious; exercise, systematic and in the open air as far as possible, without actual fatigue; "the less alcohol taken, the better;" mercurials or such medicines as increase the excretory action of the bowels and kidneys, followed by such as form soluble compounds with uric acid, and, during convalescence, tonics, as nux vomica, arsenic, quinine, and iron. James A. Myrtle, of Harrogate,²² Mar., read an interesting paper on the differential diagnosis of gout, rheumatism, and rheumatoid arthritis; and Sir Alfred B. Garrod delivered a post-graduate lecture⁶ Nov. 5, '92 on the great practical importance of separating rheumatoid arthritis from gout. An intelligible abstract of these papers would fill all the space allotted in the ANNUAL to the subject of gout, and yet they add little or nothing to what may be found in Sir A. Garrod's Croonian lecture in 1891.

DISEASES OF THE BLOOD AND SPLEEN.

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GENERAL CONSIDERATIONS.

Hoppe-Seyler⁸³ _{v. 10, p. 56, '92} and Rindfleisch²¹⁵⁸ propose new methods for the estimation of the haemoglobin. The former employs, for comparison, a prepared solution of CO haemoglobin. Rindfleisch takes up the blood with filter-paper, washes it out in a known quantity of water, and compares with a specimen of normal blood. Both methods are complicated.

Max Herz²⁰ _{B. 13, B. 2} lays down the following schema for the study of the blood: (1) haemoglobin, by Fleischl's apparatus; (2) Gärtner's haematokrit; (3) total volume of the red blood-cells in a column, by the method given below; (4) counting of the red blood-corpuscles with the Thoma-Zeiss instrument; (5) specific gravity of the plasma, by Hammerschleg's method; (6) specific gravity of the corpuscles of the blood. The volume of the red corpuscles is ascertained as follows: A capillary tube six centimetres long is moistened within with codliver-oil, then filled with the blood, closed with wax, and, after inclosing in a tube cooled with ice, revolved four times in Gärtner's centrifugal machine. After sedimentation, the length of the column of cells and that of the whole column is estimated. The object of the oil and of the ice is to prevent coagulation. Based upon the clinical application of his methods, the author has established several types of diseases of the blood-cells: acute swelling, chronic swelling, hypertrophy, and atrophy. The blood in nephritis, in cases of cachexia, and in phosphor poisoning is studied in the same light.

Thayer⁹⁹ _{Feb. 16} discusses the clinical value of the methods of examination of the blood. He recommends, as a practical and convenient stain, eosin 0.5, alcohol (70 per cent.) 100, preferably

diluted one-half with water. The cover-glass preparations are stained in this for a few minutes, washed with water, dried in air or between filter-paper, and stained for forty-five seconds with a saturated watery solution of methylene blue, diluted one-half with water. Czinzinski's solution is also useful: Methylene blue (concent. aq. sol.), 40; eosin (0.5 in 100, 70-per-cent. alcohol), 20; distilled water, 40. Thayer refers to Uskow's classification of leucocytes, which is as follows:—

A. Lymphocytes, which are subdivided into: (1) small lymphocytes, size of red corpuscles or smaller; (2) large lymphocytes.

B. Transparent corpuscles; Rich in protoplasm which does not stain; nucleus eccentric and not staining well. Of these he names three varieties: (1) small transparent corpuscles, about size of large lymphocytes; (2) large transparent corpuscles, three to five times the size of red corpuscles; (3) giant transparent corpuscles, the largest white corpuscles seen in the blood.

C. Transitional forms: protoplasm midway between that of lymphocytes and transparent forms in affinity for stains. Nucleus stains more intensely than protoplasm, and there is but little light seen about its periphery. Under this head are classified: (1) small transitional forms; (2) large transitional forms; (3) giant transitional forms.

D. (1) multinuclear neutrophile forms; (2) eosinophile cells.

Southworth¹ recommends the following method for the preparation of the cover-glass specimen: Draw the edge of a clean slide through the blood as it flows from the finger. Then, placing a finger of the other hand upon the edge of a cover-glass to steady it, quickly put the slide, held at an angle of forty-five degrees, on the cover-glass, and draw it rapidly across. A thin film of blood is left on the cover-glass. Fixation is secured on the heated metal plate.

Stengel,¹¹² in speaking of the methods of examining the blood, calls attention to the error in the instrument of Fleischl. He regards the normal percentage of haemoglobin as about 85 per cent. according to that instrument. The method of preparing fresh and fixed preparations of blood are detailed; and for clinical work the writer recommends fixing in absolute alcohol and ether, followed by staining in a 1-per-cent. solution of eosin in 70-per-cent. alcohol, with counter-staining in Delafield's haematoxylon.

A. E. Wright and D. Bruce, of Netley, Eng.,² find that the addition of a little acetic acid to a solution of eosin increases its power to stain the oxyphilic granules of the leucocytes, while the addition of an alkali to a basic stain does the same as far as the basophilic granules are concerned. They hold that the neutrophilic granules of Ehrlich are misnamed, claiming that in reality these may be colored by eosin in watery solution, and that the failure to stain in glycerin solutions of eosin is due to the solvent action of the glycerin. They would, therefore, classify all the granules of human blood as basophilic and oxyphilic, the latter alone occurring in normal blood.

THE FORMATION AND CONSTITUTION OF THE BLOOD.

Martin Schmidt⁷⁶⁸ believes that in embryonal life, at least in the liver, the white corpuscles are the result of karyokinesis of the endothelial cells of capillaries. The red corpuscles originate from the leucocytes by the appearance in the latter of haemoglobin; they also possess the power of division. In the blood of a case of pyæmia with icterus, Weintraud²⁰ found that the red corpuscles contained peculiar, variously-shaped, refractive bodies possessing active motion. They could not be stained, and seemed to disappear in dry preparations. None were discovered in the plasma. The author concluded that they were vacuoles. They were, however, not found in any one of the numerous other cases examined.

Griesbach³⁶⁵ predicates a stroma as part of the leucocytes, and believes that the granulations are the optical effects of the relation of the stroma and the contracted protoplasm lying in its meshes. Regarding coagulation, he accords with Löwit's theory of plasmochisis, and attributes, with Freund, considerable importance to the lime-salts.

Sadler⁵¹ has found that leucocytosis was generally, though not invariably, present in diseases attended with exudation, viz., pneumonia, pleuritis, pericarditis, meningitis, and polyarthritis. In carcinoma, leucocytosis was present in one-half the cases; it was absent in tuberculosis and typhoid fever. The amount of haemoglobin did not vary *pari passu* with the corpuscles, and was often very appreciably diminished when the latter were yet normal, which proves that this phenomenon is not characteristic of chlorosis.

Gundobin³⁶⁶ has made a study of the blood of children, of which the following is a *résumé*:—

1. Morphology of leucocytes. An examination of the blood of 28 children, from 7 days to 10 months old, gave an average of 12,900 white corpuscles to 1 centimetre, or 1 to 395, red. The number of red corpuscles is nearly the same as in adults,—5,000,000. As the child grows older the number of leucocytes diminishes, until, at the age of 3, it resembles that of adults. The infant's blood is richer in lymphocytes, relatively as well as absolutely, having about thrice the number found in adult blood, while the number of neutrophiles is twice as great. Digestion provokes a marked leucocytosis, characterized chiefly by an increase of the neutrophiles. The weight of the child, as long as it does not pass a certain minimum, exercises no influence on the relations of the forms of leucocytes.

2. Blood of the newly-born and of those before term. At birth there is a marked leucocytosis, which increases during the first twenty-four hours, and affects especially the neutrophiles. By the end of the second day the number lessens, until, at the fifth, it is smaller than in nurslings. Not until the seventh or tenth day is the normal proportion reached by the relative and absolute increase of lymphocytes.

3. The red corpuscles. The size of these is more variable in infants than in adults, the smaller corpuscles being smaller, and the larger being larger. They are more variable to reagents; the haemoglobin is less firmly fixed. Nuclei are apparent during the first few days. Microcytes are more abundant in the blood of the newborn than in that of nurslings. The diurnal variation in the number of erythrocytes is greater in infants than in adults. On the whole, the blood is characterized by a more marked instability and tendency to oscillation than that of adults. The number has been variously estimated from 8,300,000 to 3,200,000. As a rule, the number is increased during the first twenty-four or forty-eight hours, the augmentation coinciding with that of the leucocytes. The haemoglobin seems to be greater at birth than in nurslings or adults.

4. Chemical peculiarities. The blood is of a very deep color during the first days of life. According to Krüger, the blood of the newborn has a marked tendency to coagulate, but coagulation

is slow. The blood is richer in iron, poorer in fibrin, than in a child of 15 days. It also possesses more salts than the blood of adults, being richer in sodium and poorer in potassium salts. In the blood of four premature children the number of leucocytes was smaller than at term. Regarding the influence of disease, acute affections are, as in the adult, attended with leucocytosis. Chronic diseases, such as inherited syphilis, produce oligocythaemia and an increase, relatively and absolutely, of the lymphocytes; the neutrophilic elements show an absolute increase.

Zappert⁵⁷ _{Feb. 20} has counted the eosinophile cells in fresh blood by means of the method suggested by Mayet, slightly modified. In health the number of the eosinophiles may be divided into three groups: low normal values of from 60 to 100, medium normal values 100 to 200, and high normal values 200 to 250 in a cubic millimetre. We may, however, find very high numbers in perfectly healthy individuals. In children the number is always high. In menstruating and in pregnant women there was no increase; likewise, not in leucocytosis of digestion, nor at different hours of the day.

In leukaemia there is always a great absolute increase, but not a relative one. Chlorosis may present normal figures or an increase or a decrease of eosinophile cells. These differences are devoid of prognostic value. Pulmonary tuberculosis is associated with a diminution, while nephritis, intestinal disturbances, functional neuroses, and skin diseases are associated with an augmentation of the number of eosinophile cells. In acute febrile diseases there is a decrease, even a disappearance, of these cells during the febrile period. As to the source of the eosinophile cells, the author is inclined to derive them from the neutrophile elements of the blood.

Cannon⁶⁹ _{Feb. 22} considers the normal proportion of eosinophile cells in the blood to vary between 1 and 3 per cent. of all leucocytes. In 13 out of 22 healthy individuals he found mastzellen in the blood,—an average of 0.47 per cent. of all leucocytes. Schulz³²⁶ _{B.S.I.N. 2, 2} concludes as follows: 1. That which is generally termed leucocytosis does not represent an absolute increase of white corpuscles, but only a modification in their distribution, which modification he has not been able to explain. 2. Leucocytosis is only a local condition. 3. Researches as to the origin of the additional leuco-

cytes indicate that they already existed in the blood-stream, and were not produced at the time by the haemopoietic organs.

Pick⁸⁸ v.17,p.40,¹⁹² found, in cases of small-pox, usually no leucocytosis during the eruptive stage; during the stage of suppuration, however, it was nearly always present. Maragliano²⁰²³₁₉₂ denies that there is any relation between the gravity of acute infectious diseases and the degree of leucocytosis, and that marked leucocytosis improves the prognosis of pneumonia.

Koppe's results²⁰²³_{Apr.12,15} agree with those of Eger in proving that a sojourn in a high altitude increases the number of red corpuscles. He found, however, that the haemoglobin falls a little below the normal. The volumetric estimation with Gärtner's haematokrit, slightly modified by the author, revealed a diminution in volume as the number of corpuscles rose, and *vice versa*; whence it follows that the red corpuscles are smaller when in larger numbers.

Haig²_{Sept.23} attempts to show by several curves that as the quantity of uric acid which passes through the blood rises the *blood-decimal* falls. The normal ratio of uric acid to urea is 1 to 33; anything above this represents, according to the writer, the quantity of uric acid that passes through the blood. The blood-decimal is the ratio of haemoglobin to cells,—*i.e.*, percentage of haemoglobin equals percentage of red cells.

A number of morbid conditions are by the author ascribed to "uric acidæmia." Post-febrile bradycardia, the high-tension pulse, and the mental depression and subnormal temperature are due to the admixture of uric acid to the blood. During the fever the alkalinity of the blood is diminished and the urates are stored in the tissues. When the fever ends, the uric acid finds its way back into the blood and produces the symptoms named above.

From a quantitative study of the albuminous bodies in the blood-serum of patients, Limbeck⁸⁸_{Feb.25} has reached the following conclusions:—

1. All processes associated with an exudation of fluid from the blood lead to a loss of the total proteid bodies, which, if large, affects both albuminous bodies about equally; if small, more especially the albumen. If the exudation of albuminous substances is lessened, an increase of their quantity may be observed in some cases, the increase being greater in the albumen than in the globulin.
2. Grave disorders of nutrition, especially severe diabetes

mellitus, also effect a decrease of the proteids of the blood-serum. 3. The number of red corpuscles appears, within wide limits, to be independent of the quantity of albuminous bodies in the serum. 4. The great diminution or total disappearance of the globulin in the blood of rabbits made immune against swine-plague (Emmerich) did not find its counterpart in the blood of persons suffering or convalescing from infectious diseases.

By the employment of a modified Kyrldahl's method, von Jaksch<sup>2023
Apr 12, 18</sup> obtained the following values for the albuminous bodies of the blood: In the blood, 22.63 per cent.; in serum, 8.6 per cent. The proportion of water was 77.28 per cent.; the solids, 23.1 per cent. In all kinds of intoxications and in nervous diseases these figures are unaltered. In heart disease the proportions are very variable. The decrease of the proportion of the albumens is associated with an increase of that of the water. This is also true of nephritis with or without oedema. The various anaemias show lessening of the albumens and increase of the water elements. Only in diabetes is the reverse the case; the quantity of albumens may reach 33 per cent. The serum represents no change in its percentage of albumen.

In some experiments on conditions influencing the density of the blood, Grawitz<sup>114
B.Z., 1856</sup> found that sweating, as a rule, increased the density, the increase bearing a proportion to the amount of perspiration; that in certain cases there is no increase, even a diminution. This is an individual peculiarity, and constant in the same person. The specific gravity sinks gradually to normal after perspiration ceases, more rapidly if fluids are taken in. Cold, by causing a contraction of the vessels and an elevation of the blood-pressure, produces a concentration of the blood,—i.e., a passing out of fluid which rises as the temperature falls. Heating of the body leads to vascular dilatation and lowering of the blood-pressure, and a consequent entrance of fluid into the blood; therefore, to a diminution of density. Considering the large amount of fluid which necessarily passes out of the blood under the influence of sudden cold, the thought is justifiable that this phenomenon, combined, perhaps, with an insufficient vasomotor apparatus, furnishes the key to the understanding of disease due to cold.

In a study of the respiratory interchange of gases in anaemia Bohland⁴ obtained results differing from what, on theoretical

grounds, had heretofore been assumed. The belief has always existed that anaemia, being associated with a diminution of haemoglobin, must necessarily lead to a decrease of the consumption of oxygen. The experiments of Bohland prove that there is in anaemia no diminution of the respiratory metabolism during rest, and that the augmented destruction of proteids accompanying severe anaemias cannot be explained thereby, unless the consumption of oxygen were so active in one organ that others suffered for the want of it. If this were the case, the dyspnoea would probably be more intense; moreover, it would be difficult, except in leukæmia, to name the organ where such active metabolism could take place. In severe cases of anaemia the author found an increased respiratory metabolism; in cases especially in which there was a heightening of the proteid destruction.

THE PATHOLOGY OF THE BLOOD AND BLOOD-DESTRUCTION.

Henry¹¹² contributes a paper on the pathology of the blood, in which he reviews the present status of knowledge regarding this question, and expresses his own views concerning chlorosis and pernicious anaemia particularly. The blood-changes in chlorosis he finds to be of three kinds: "(1) the blood-corpuses may be of normal size and number, their only change being a deficiency of coloring matter; (2) they may be diminished in size and normal in number and in percentage of coloring matter; (3) they may be diminished in number with diminished, normal, or, perhaps, increased percentage of haemoglobin." In regard to pernicious anaemia, while admitting the accuracy of Hunter's views regarding haemolysis, Henry still maintains the view that there are evidences of faulty haemogenesis as well, basing this especially upon the appearance of the macrocytes, which he cannot regard as other than malformed bodies, the result of imperfect haemogenesis.

William Hunter, of London,^{6 Nov. 26, Dec. 10, 17, '92; Nov. 26, Dec. 3, '92} contributes a paper on the physiology and pathology of blood-destruction which is worthy of the most careful study. In the liver, which has heretofore been looked upon as the principal seat of haemolysis, he finds two distinct processes,—one resulting in the deposition of coarse and irregular granules in the leucocytes and endothelial cells of the hepatic capillaries, the other causing a finer granula-

tion of the liver-cells themselves. The former he regards as a chronic and passive process in the sense that the blood itself is little concerned in an active manner, the destruction mainly affecting the red corpuscles. The latter is acute and active, and rather to be designated as a true haemolysis. Haemolysis, however, may occur, and does occur constantly in normal conditions, without pigmentation, in the process of bile-formation. The rôle of the spleen in blood-destruction is far more important than the liver, and haemolytic agents, such as toluylendiamin, exercise their power by disturbing the action of the splenic cells, which are active and do not merely take the part of filters. Water, glycerin, and pyrogallic acid act destructively upon the blood itself, but such action is not the rule with haemolitics. Next to the spleen in importance is the gastro-intestinal mucosa, the haemolytic power of which is seen during digestion in the increase of bile, of leucocytes in the blood, and uric acid in the urine, and the increased size of the spleen. The liver is next in power and importance as a blood-destroyer, but is especially active in removing haemoglobin after it has been liberated by the spleen and gastro-intestinal mucosa. The bone-marrow is the least important of the blood-destroying tissues. In disease haemolysis is generally indirect,—that is, the blood is secondarily affected by derangements of the organs named. Paroxysmal haemoglobinuria, the disintegration of blood in burns and scalds, and malaria are exceptions, since in each of these evidence points to a direct destruction of blood.

Maragliano and Castellino¹¹⁴ have studied the necrobiotic changes of red corpuscles, both in normal and pathological states. They divide the changes into endoglobular and globular, as here described:—

A. *Endoglobular Changes.*—The normal corpuscle begins to undergo changes in thirty to seventy minutes; these consist of a deepening of the central depression and a decrease of the haemoglobin, the plasma becoming coincidently yellowish. The decolorized endoglobular substance shows marked amoeboid movements in from two to two and a half hours, assuming curious shapes. These movements grow steadily more active until the projections divide and separate, the corpuscle, at the same time, becoming granular. The observations were made on fresh cover-glass prepa-

ration surmounted with a ring of vaselin and paraffin, and also on fixed specimens.

B. *Globular Changes.*—In thirty to seventy minutes fine-pointed projections are seen to form on the corpuscle, which deepen and give to the cell a stellate, club-shaped, or mulberry appearance. After about nine hours amoeboid movements set in, with the protrusion of pseudopods, depressions, and indentations, at times complete division into two or more bodies. True corpuscles do not undergo these changes. Experiments with animal blood gave practically the same results. With the gradual death of the corpuscles their affinity for methyl-blue solutions increases, which enables us to measure their vitality. For purposes of fixing the morphological changes, rapid air-drying of a thin film and subsequent exposure to a temperature of 180° F. (82.2° C.) for twenty-four hours were found most valuable. The authors found that in certain diseases these necrobiotic changes, which normally appear in seven or eight hours, set in very early. Poikilocytosis is considered a form of necrobiosis.

In regard to the amoeboid movements, the writers deny the possibility of eliciting them by artificial means.

Concerning the effect of blood-serum on the red corpuscles, Maragliano³⁴ _{Oct. 22, '92} found that the globulicidal action was greater the less the quantity of NaCl contained in the serum. Previous to the destruction of the corpuscle, the haemoglobin undergoes some chemical change which makes it similar to biliverdin. Castellino, under Maragliano's direction, has made some studies on the effects of intra-venous NaCl solutions, and concludes that they possess power (1) to neutralize circulating poisons and to destroy their effects; (2) to eliminate noxious substances by stimulating the renal function; (3) to increase the quantity of blood after copious haemorrhages; (4) to compensate for the loss of fluids from diarrhoeas; (5) to improve the blood as a whole. He recommends intra-venous injections of NaCl solutions in uræmic and diabetic comas, and in that of jaundice.

Jemma,²¹⁵⁹ _{Oct. 28, '92} from numerous observations regarding the anti-bacterial action of the human blood, sums up as follows: 1. The serum of healthy human beings is toxic against the typhoid and cholera bacilli, less so against the staphylococcus (?), not at all against the streptococcus erysipelatis. 2. The blood acts similarly

during the acme of acute infections, as variola, articular rheumatism (?), erysipelas, typhoid fever. 3. The blood obtained from typhoid-fever cases during the height of the fever (39° to 40° C.— 102.2° to 104° F.) quickly kills the typhoid bacilli; also after one and a half hours, if they are inoculated into the serum. On the other hand, the same number of bacilli introduced into the same quantity of healthy serum, or into that from persons suffering from another infectious disease, perished only after two or three hours. 4. Blood-serum obtained from erysipelatous patients had no influence, during any stage, upon the streptococci of erysipelas. 5. The serum of patients afflicted with carbuncles is an excellent culture medium for the staphylococcus. 6. The toxic action of serum which had been kept in an oven at 55° C. (131° F.) for one-half hour, at 50.5° C. (123° F.) for three hours, and at 45° C. (113° F.) for twenty hours was lessened, but not destroyed. Preservation for twenty hours at 37° C. (98.6° F.) did not affect its activity at all.

PERNICIOUS ANÆMIA.

A. Wiltschur ⁶⁹_{Aug. 3} reports a well-marked case of pernicious anaemia (red corpuscles, 250,000 per cubic millimetre; haemoglobin, 11 per cent.), the patient being a man, 47 years old, who had been ill for three months, and died nine days after admission to hospital.

The most prominent symptoms throughout the course of the disease were gastro-intestinal. At the autopsy the stomach was found in a state of chronic catarrh, with polypoid elevations of the mucosa. The solitary follicles of the small intestine were swollen, and the mucous membrane of the large intestine was slate-colored. Wiltschur's theory of the pathogenesis of the disease is practically identical with that of W. Hunter, namely, that the affection is an auto-intoxication with ptomaines absorbed from the gastro-intestinal mucosa.

A very interesting discussion was held at the meeting of the Glasgow Medical Society, being introduced by George S. Middleton's report of eleven cases of the disease. ²¹³_{Jan.} The participants in the discussion were McCall Anderson, Coats, Lindsay Steven, Gairdner, Barlow, Newman, Workman, and R. M. Buchanan. Like most discussions of the sort, it added nothing material to our knowledge of the subject, but is well worthy of study, since it con-

tains a *résumé* of the views of several distinguished clinicians. Adami²⁸² reported a case of fatal pernicious anæmia, the patient being a man aged 52. At the autopsy the appearances were mostly of a negative character, the organs being anæmic, the walls of the stomach and intestine pale and thin, and the subcutaneous fat abundant. Adami claims that this is the first case of pernicious anæmia in which the blood-serum has been subjected to chemical analysis. The proteids of the plasma were altered in their relative proportions. McCall Anderson, of Glasgow,²¹³ reports a case, in a girl aged 17, which presents some unusual features. Under the use of arsenic, by the mouth and hypodermatically, "recovery" is said to have taken place, notwithstanding the fact that the number of red blood-corpuscles never reached 3,000,000 per cubic millimetre. On the 9th of October there was a sudden rise of temperature, and ten days later the patient died, the temperature having ranged, for the ten days before death, between 102° and 104° F. (38.9° and 40° C.). In the right lung, at the apex, there was found what is described as a dense "mycotic infiltration," and the reporter is of the opinion that "poisoning of the blood resulted from the entrance of micro-organisms into the system." In his remarks upon Middleton's paper above referred to, Anderson refers to this very case, and there raises the question whether it was possible that the hypodermatic syringe employed in the treatment "might have been at fault through defective sterilization." This case was anomalous, also, in that the liver was free from any unusual accumulation of iron, while the urine was pale. On the other hand, there were retinal haemorrhages and other typical symptoms and signs of pernicious anæmia.

At the Medico-Chirurgical Society of Edinburgh Robert Abernethy³⁶ exhibited microscopic sections of a piece of tissue which had been passed, *per rectum*, by a patient in the Royal Infirmary under treatment for pernicious anaemia. The piece of tissue in question was five inches long and two and one-half inches broad, and at one end formed a tube which was invaginated. Microscopic examination showed that it consisted of the whole thickness of the intestine. In the discussion upon the specimen there were different opinions as to its precise nature, and Greenfield and Russell were appointed a committee to investigate the matter and report to the society.

Friedrich Krüger, of Dorpat, ²¹ _{Dec. 24, 1892} attributes the origin of the primary or essential anaemias (chlorosis and pernicious anaemia) to irritation of the sympathetic, resulting in altered function of the spleen. He found the blood of the splenic vein richer in haemoglobin and dry residuum than the blood of the splenic artery, and concluded from his experiments that haemoglobin is both formed and destroyed in the spleen, formation being in excess of destruction. In conditions of sympathetic irritation the blood-forming function of the spleen is impaired. He argues that, in all the diseases in which the clinical picture of pernicious anaemia is present, such as gastric carcinoma, ancylostomiasis, atrophy of the stomach, etc., there is coincident irritation of the sympathetic, manifested especially by vomiting, salivation, and dilatation of the pupil. The paper is suggestive, but, in my opinion, inconclusive, and its author takes no account of the valuable work of Hunter, which refers the origin of pernicious anaemia to poisoning by ptomaines generated in the intestinal canal. Perles ¹⁰⁶⁹ _{June} has observed, in two cases, large numbers of amœboid corpuscles in fresh-blood preparations. These bodies, which were much larger than a red corpuscle, resembled thin plates and were possessed of very active movement. He thinks they cannot be degenerated corpuscles. In view of the fact that the red blood-corpuscles of pernicious anaemia have been observed by Hayem and others to be possessed of amœboid movement, I would hesitate, in the absence of further proof, to regard the bodies described by Perles as other than degenerated blood-constituents.

W. Minnich ¹³ _{July 15} reports the results of the examinations of the spinal cord in five cases of pernicious anaemia, the patients having presented no signs of spinal disease during life. In all of the cases changes, such as capillary haemorrhages, sclerosis of the posterior columns, and segmentation of the axis-cylinder, were found. The same changes were observed in three cases of chronic icterus, in a case of leukaemia, in two cases of chronic nephritis, and in a case of carcinomatous cachexia. These statements of Minnich are corroborative of previous observations of the same sort by Lichtheim, to which attention was called in the ANNUAL (vol. ii, E-10) for 1890.

J. H. Musser, of Philadelphia, ¹¹² _{July} reports a case of pernicious anaemia in a negro woman, whose age is given as 50 years, but

who was probably much older. Death occurred from gradual asthenia, and an autopsy was performed by Griffith. The usual appearances of pernicious anaemia, such as fatty degeneration of heart, foetal condition of marrow, and excess of iron in liver and kidneys, were present. There was, besides, "entire absence of organic disease in all the organs examined. The only blood-count recorded gave 1,600,000 red corpuscles per cubic millimetre (32 per cent.), while the haemoglobin amounted to 16 per cent. A disproportion of this kind is certainly unusual in pernicious anaemia.

R. Douglas Powell¹⁰⁷⁷_{Aug. 16} delivered a clinical lecture on pernicious anaemia at the Middlesex Hospital, the patient being a young man, aged 20, in whom the symptoms of profound anaemia were consecutive to violent exertion. Every symptom of the disease, with one notable exception, was present. The urine, instead of presenting the appearance upon which so much stress is justly laid by Hunter, was habitually pale. The corpuscles numbered 1,000,000 per cubic millimetre (20 per cent.), while the haemoglobin amounted to about 20.5 per cent. The points of differential diagnosis between pernicious anaemia and other grave anaemic conditions are thoroughly discussed.

Treatment.—At a meeting of the Harveian Society of London, March 2d, William Hunter²_{Apr.} read a paper on the diagnosis and treatment of pernicious anaemia. Under the former head he reiterated his views, with which all hematologists are familiar, as to the pathogenesis of the disease, and stated his belief that in its treatment our main reliance must be placed on the use of antisepsics, the best being beta-naphthol and salol, along with arsenic when that can be borne. I would take exception to Hunter's statement that salol is an intestinal antiseptic.²¹⁶² "An intestinal antiseptic, according to Bouchard,—and there is no better authority,—must be more or less insoluble and exert no toxic action on the organism. This definition excludes salol, which no sooner comes in contact with the alkaline secretions of the intestine than it splits into carbolic and salicylic acid, both of which are rapidly absorbed."

The best of intestinal antisepsics is undoubtedly thymol,—a fact which seems to be more fully appreciated in Italy than elsewhere. In accordance with the view that pernicious anaemia is due to the absorption from the intestine of substances foreign to

the healthy body, and destructive to the red corpuscles, its treatment by intestinal antiseptics is certainly most rational.

W. G. Evans⁶,_{Mrs.} reports a case of pernicious anaemia treated successfully by transfusion. The blood injected was defibrinated and mingled with a 2-per-cent. solution of phosphate of sodium in the proportion of $5\frac{1}{2}$ ounces (170 grammes) of the former to 3 ounces (93 grammes) of the latter. In this case the symptoms were similar to those of pernicious anaemia, but it is incomplete, inasmuch as there is no account of an examination of the blood or of the retina.

Transfusion should never be omitted in the treatment of pernicious anaemia, provided improvement does not follow the free use of arsenic. The best method of performing transfusion is probably that employed by Brakenridge, of Edinburgh,³⁶,_{Oct. '92} whose paper was quoted in the ANNUAL for 1893. The blood is kept fluid by admixture with one-third part of its bulk of a 1-to-20 (5 per cent.) solution of phosphate of soda in distilled water kept at blood-heat. John Duncan, who performed the transfusions in Brakenridge's cases, insists upon the necessity of slowness in operating. He regards thirty minutes as the minimum time that should be occupied in injecting 8 ounces (250 grammes) of the fluid.

CHLOROSIS.

In the course of a clinical lecture on chlorosis, James Tyson, of Philadelphia,¹¹²,_{Mrs.} gives a detailed account of the methods of examining the blood, especially with the Thoma-Zeiss apparatus. Girode⁷,_{Oct. '92} describes the post-mortem appearances in the case of a young woman, 19 years of age, who died of typhoid fever consecutive to chlorosis. The immediate cause of death was thrombosis of the sinuses and veins of the convexity of the brain. Before death oedema of both lower extremities had suddenly developed, and was, in all probability, due to venous thrombosis. It is well established that the condition of the blood in chlorosis is such as to favor coagulation, and this fact should be borne in mind in making a prognosis in the case of chlorotic women who are attacked with typhoid fever or other adynamic affections. Audry, of Lyons,²¹¹,_{Jan.} reports a fatal case of chlorosis, death occurring suddenly from pulmonary embolus. The latter had its origin in a thrombus of the left iliac vein. In this case, as well as the pre-

ceding, the diagnosis was based upon the symptoms, there being no account of an examination of the blood.

Hermann Rieder, of Munich,³⁴ believes in the possibility of a late development of chlorosis, and gives the history of three carefully-studied cases in support of this view. The opinion prevalent among haematologists is that a patient over 24 years of age who presents the signs and symptoms of chlorosis will be found, on careful inquiry, to have previously had a similar attack in the decade between 14 and 24 years. In Rieder's cases, which were typical examples of chlorosis, the patients were aged, respectively, 36, 40, and 42, and had never previously been chlorotic. The reports of these cases bear the evidences of minute investigation, being, in this respect, in marked contrast to most of the publications upon the subject of chlorosis. O. Rosenbach, of Breslau,⁵⁷ regards chlorosis not as an essential disease, but as a *process* symptomatic of various states of malnutrition. He traces a connection between chlorosis and the early use of the corset, and believes it to consist in an interference with the respiratory functions. The author reviews Rosenbach's treatise on the subject.²¹⁶³

George Herschell, of London,¹⁵ in an interesting and suggestive paper, reports three cases of chlorosis which were characterized by the presence of a peculiar "chromogen" in the urine. A chromogen is a colorless substance which becomes converted into a pigment by oxidation, and the chromogen in question is manifested by the urine becoming of a rose-red color on the addition of nitrous-nitric acid,—*i.e.*, pure nitric acid to which a small quantity of the common yellow acid of commerce has been added. Herschell believes this chromogen to be a derivative of skatol, and, therefore, to be derived from faecal absorption. In all his cases there was marked constipation, the relief of which by large enemata constituted the basis of his treatment. Restoration to health coincided with disappearance of the urinary chromogen. It may be remarked incidentally that Herschell's third case resembles, in some important features, pernicious anaemia quite as much as chlorosis, and illustrates the possibility of a transition from the latter to the former. Herschell's contribution deserves the attention of all haematologists.

Forchheimer, of Cincinnati,⁹⁹ terminates a paper on chlorosis with the following conclusions: 1. Chlorosis is due to oligo-

chromæmia. 2. Chlorosis is the result of faulty haemopoiesis. 3. In chlorosis the fault in haemopoiesis lies in diminished haemoglobin production. 4. Haemoglobin is principally formed in the intestine, proved (*a*) by direct investigation upon lower animals, and (*b*) by direct observation upon the human being. 5. Haemoglobin formation can be increased by the introduction into the intestine of agents not containing iron, but preventing putrefaction. 6. Chlorosis is due to a prevention of haemoglobin formation by destructive agents acting upon the precursor of haemoglobin in the intestine.

All of these "conclusions" are, and have been for some time, generally accepted by leading haematologists. The most interesting of them is the fourth, because of the author's demonstration that the blood of the mesenteric vein contains more haemoglobin than that of the mesenteric artery, and that, consequently, haemoglobin is formed in the intestine. Forty observations give the following averages: In the artery, red corpuscles, 5,362,000; haemoglobin, 78 $\frac{1}{2}$ per cent. In the vein, red corpuscles, 4,546,000; haemoglobin, 78 $\frac{1}{2}$ per cent. "The number of red corpuscles is diminished in the veins, while the quantity of haemoglobin remains the same; therefore, haemoglobin is absolutely increased in the vein, and each red corpuscle carries more haemoglobin in the vein than in the artery."

F. Chvostek, of Vienna,²⁹⁷ has observed enlargement of the spleen in twenty-one out of fifty-six cases of chlorosis. Inasmuch as a "fœtal state" of the spleen, marrow, and other hematopoietic organs has been described as characteristic of chlorosis, this observation is interesting. The report, however, is incomplete, as there is no account of an examination of the blood in these cases; nor are there details of the previous history of the patients. There is nothing incompatible between chlorosis and malarial fever, and the latter is characterized by enlargement of the spleen.

Charles Luzet⁹⁹ discusses the pathological anatomy of the disease, and arrives at the conclusion that the pathological lesions of chlorosis may be limited to troubles of haematopoiesis, in relation with modifications of nutrition alone, no known anatomical lesion of any organ as yet explaining these modifications. He regards the vascular hypoplasia with which Virchow believes chlorosis to

be inseparably connected as a consequence, and not a cause, of the condition of the blood. J. H. Musser, of Philadelphia,^{July 11²} gives a brief report of a case of chlorosis in a mulatto aged 22. The case presents no special features, except those pertaining to race. Joseph M. Patton, of Chicago,^{Feb. 18⁵} reports a case of chlorosis with endocardial and vascular inorganic murmurs, and discusses the causation of the latter. The murmur in the subclavian was heard only during deep inspiration, and is attributed by Patton to pressure on the artery by the expanded lung. At the meeting of the British Medical Association ^{Aug. 6⁶} Lloyd Jones made some remarks on the pathology of chlorosis, in the course of which he pointed out that "the specific gravity of the blood varied from birth onward in a different manner in the male and in the female. The specific gravity in both was equal until about the age of puberty. In the male it then continued to rise up to a certain stationary point, whereas in the female it underwent a diminution to a certain stationary point." Jones believes that the entire volume of the blood is increased in chlorosis,—a view which has been advocated by the editor for years. This is proved, among other things, by the vascular murmurs which are produced by blood of low specific gravity flowing through the vessels under high tension.

Treatment.—Among the most valuable contributions of the year is the paper on "The Treatment of Chlorosis by Iron and Some Other Drugs," by Ralph Stockman, of Edinburgh,^{Apr. 29²} who discusses the various theories of the *modus operandi* of iron, namely, (1) the absorption theory, (2) the stimulation theory, and (3) the well-known theory of Bunge. The latter, in brief, is that in chlorosis, in consequence of the digestive disturbances so common, abnormal fermentations and decompositions take place in the gastro-intestinal tract, and give rise to the formation of unusual quantities of sulphuretted hydrogen and alkaline sulphides. These decompose the iron contained in the food, and completely unfit it for the purposes of nutrition. By administering an inorganic preparation of iron, we protect the organic preparations of that metal in the food, for the sulphur combines with the iron administered, forming an inorganic compound which, according to Bunge, cannot be absorbed, and allows the iron normally contained in the food to be assimilated.

Stockman has given Bunge's theory the *coup de grace* by

demonstrating (1) that chlorosis may be cured by the hypodermatic use of inorganic preparations of iron; (2) that chlorosis may be cured by sulphide of iron given by the mouth; (3) that bismuth, manganese, and other drugs, which are just as capable as iron is of absorbing sulphuretted hydrogen, are inert in chlorosis. One of the conclusions of the author, which is confirmed by my own experience, is that inorganic preparations of iron cure much more quickly than organically-combined iron does. Kober's preparations, known as haemol and haemogallol, were found by Stockman to be of little or no use in chlorosis. Arsenic, hydrochloric acid, and manganese were also found to be practically inert. Stockman's observations were made with Gowers's haemoglobinometer and haemocytometer, and are evidently trustworthy. He believes the standard of these instruments to be too high, and gives it as his opinion that the normal percentage of haemoglobin in women is only about from 82 to 88 per cent. on Gowers's haemoglobinometer. This statement will be corroborated by all who are familiar with the instruments in question.

Andrew Smart, of Edinburgh, ^{Feb. 18, 25}⁶ reports fifteen cases of anaemia and chlorosis treated with the chief iron preparations commonly in use, and gives precise details of the examination of the blood in each. He awards the first place to sulphate of iron as a remedy in anaemia (non-pernicious) and chlorosis. "It is exceptionally active in restoring the deficient corpuscles, alike in their number and character, and is also notably active in restoring the haemoglobin in chlorosis." The other drugs employed in this series of cases were the saccharine carbonate of iron, which he regards as next in efficiency to the sulphate, the protochloride, the phosphate, the protoxide, and arsenic. The last-mentioned remedy, when used alone, "did not appear to exert any direct or appreciable effect on the renewal of the red blood-corpuscles and haemoglobin in the cases of symptomatic anaemia and chlorosis in which it was tried. When, however, combined with an iron, especially the sulphate, I could not avoid being convinced that the efficacy of the iron was enhanced by the combination." The cases placed upon a nutritious diet, with the addition of malt and port-wine, or upon arsenic, did not improve until iron was added to their treatment. In one of Smart's cases hydrochloric acid was demonstrated to be absent from the gastric secretions, and the

experiment was tried of treating the patient with HCl alone. Under the use of this substance the red corpuscles increased in number from 2,500,000 per cubic millimetre to 4,200,000 per cubic millimetre, while the haemoglobin, during the entire period of treatment (forty-two days), only increased from 30 per cent. to 36 per cent. At this stage of incomplete treatment the patient left the hospital of her own accord. "The result of this clinical experiment, as that of every other, proves that iron in some form is absolutely indispensable in the treatment of chlorosis, as well as of symptomatic anaemia, to effect complete recovery."

Forchheimer, of Cincinnati, ^{Aug. 24}⁹⁹ has treated eleven cases with salol and hydronaphthol, with improvement in all. The smallest amount of haemoglobin gained in one week was 5 per cent.; the greatest, 20 per cent. Of the two drugs, hydronaphthol appeared to be the more efficacious. Rosenbach ^{Mar. 6}⁵⁷ counsels absolute rest in bed in severe cases, and abstinence from long-continued exertion or violent exercise in the milder ones. He believes that, with careful attention to the diet and hygiene of the patient, iron and other drugs may be dispensed with. This is certainly contrary to the experience of most practitioners, who find iron indispensable. Duebos, of Tours, ^{Feb. 23}¹⁰⁰ differs radically from the last-mentioned author in that he regards soluble iron as a specific, and recommends regular walks in the open air. If, for any reason, out-door exercise cannot be taken, inhalations of oxygen, either pure or mingled with atmospheric air, should be administered. The activity of the skin is to be maintained by baths and frictions, and the diet should, above all things, be varied.

Frederick Taylor, of London, ^{Sept. 15} urges the importance of physical rest, and reports four cases in which its advantages were manifest. He believes that the "classical treatment by iron, or by iron and purgatives, is not assisted, but much counteracted, by the prescription of exercise."

Giovanni Dori, of Pisa, ^{July 29-31}⁵⁸⁹ reports eighteen cases of "chloro-anaemia" treated with hypodermatic injections of iron preparations, and in nearly all cases with excellent results. The latter were all verified by counts of the red corpuscles and tests of the percentage of haemoglobin. The author does not state what instruments he used in his examinations, which is to be regretted, in view of the fact that the percentage of haemoglobin is stated to

have been 100 in two of his cases and 95 in six others at the time of their discharge. As previously stated, it is very unusual for such figures to be obtained with Gowers's instrument, the standard of which is certainly too high. The same is true, according to my experience, of Fleischl's haemometer. Another peculiarity of several of Dori's cases is that, at the first examination, the percentage of haemoglobin was higher than that of the number of red corpuscles. This observation, if correct, should exclude his cases from the category of chlorosis. The preparations of iron employed hypodermatically by Dori were the pyrophosphate of the ammonio-citrate, the arseniate of the sodio-citrate, and the ammonio-citrate. The first gave rise to pain and inflammation at the point of injection, and was abandoned; the second caused less local disturbance, but the improvement under its use was tardy. The third is said to have given "splendid results." It may be injected in the dose of 0.5 to 1 grammie ($7\frac{3}{4}$ to $15\frac{1}{2}$ minims) in 1 grammie ($15\frac{1}{2}$ minims) of water, the point of election being the interscapular region.

LEUKÆMIA AND PSEUDOULEUKÆMIA.

Janowski⁸⁵⁴ states that the increase of eosinophile leucocytes in the blood of leukæmic patients is not of diagnostic importance, since it is observed in other conditions also; nor is it invariably present in leukæmia. If the number is small, we may, according to the author, exclude involvement of the bone-marrow. The granulations are best stained with 1-per-cent. solution of eosin in 70-per-cent. alcohol. They may, after having been recognized by Ehrbech's method, be distinguished, without the aid of stains, by the size and sharp contour of the granules.

Dock, of Ann Arbor,⁵ Aug. reports an interesting case of chloroma, and refers to sixteen cases previously reported in literature. The primary seat of the disease was the periosteum in and about the orbit, and there were wide-spread metastatic nodules, all of pea-green color. The patient was a lad of 15 years, and most of the recorded instances have been in growing persons. The sexes are equally affected. Clinically, the disease resembles leukæmia and pseudoleukæmia, and, as in the author's case, there may be marked leucocytosis. Pathologically, chloroma is to be regarded as sarcoma, the cause of the green pigmentation being as yet more or

less doubtful. The secondary growths are more nodular and circumscribed than are the lymphatic infiltrations of ordinary leukæmia. The primary seat of the disease is generally in the periosteum of the cranium or face, and ophthalmic symptoms are frequently the first to call attention to the disease.

Jaceoud, of Paris,³ again urges the intimate relation of leukæmia and pseudoleukæmia, both being the outcome of a lymphogenous diathesis, the latter, in mild cases, inducing merely leucocytosis. Pseudoleukæmia usually proves fatal before a transition into leukæmia has occurred, most commonly from intra-thoracic tumor.

Vesemeyer, of Freiburg,³⁴ reports three cases of acute leukæmia terminating in three, five, and ten days, respectively. The acute onset of the disease and its general features so strikingly resemble those of infectious processes that the author considers the question of etiology, and refers to the theory of Köttitz, that the leucocytosis of leukæmia is a reactive condition following auto-intoxication with peptones and consequent leucolysis. Eventually the overaction of the blood-making organs would lead to hypertrophy. The same author^{116 Apr. : 80 Sept. 15} reports the case of a child, aged 9 months, which was evidently rachitic, but had, in addition, certain symptoms pointing to leukæmia, and decided leucocytosis. A month later the lymphatic glands suddenly enlarged and the blood was flooded with leucocytes, the proportion rising to one to three of the red corpuscles. Under treatment with tincture of berberis vulgaris and, later, berberine, and external application of ammonium chloride and camphor in the form of a salve, the glands softened and discharged, and the child eventually recovered, the blood becoming entirely normal. Sometime later, however, it died in convulsions, supposed to be due to teething.

Middleton, of Glasgow,^{213 May} reports two interesting cases of leukæmia in childhood. The first was a child of 16 months, who had had repeated attacks of feverishness, in one of which his belly enlarged, his skin became pallid, and, later, the typical symptoms of leukæmia were discovered. The proportion of white to red corpuscles was 1 to 9. There was evening pyrexia. Post-mortem leukæmic tumors were found in several of the organs. The second case occurred in a boy of 4 years, who was still alive at the time of report. Nobl, of Vienna,^{57 Dec. 11, '92} reported two cases of acute leu-

kæmia, occurring in women aged 30 and 40 years, respectively. In the examination of the blood Nobl regards the discovery of the mitoses of Müller as the only certain evidence of leukaemia, an opinion from which Schlesinger, Zappert, and others dissented. In both cases the eosinophilous cells were scanty. Dansac, of Paris,³¹ _{Oct. 20, 1902} reports a most instructive case of acute leukæmia in a lad of 17 years. The disease was abrupt in onset, the boy having been entirely healthy before; the clinical features were those of a rapid, infectious purpura, and death occurred after six days. Post-mortem examination showed the typical lesions of leukæmia in the spleen and liver, but the lymphatic glands were wholly normal. Eichhorst, of Zurich,²⁰ _{B. 130, H. 8} also reports a case of acute leukæmia in a lad of 8 years. The clinical picture was that of purpura haemorrhagica in this case also, and post-mortem there was found a pure lienal form of leukæmia. The duration was fourteen days. Eichhorst has collected twenty-seven cases of acute leukæmia.

A. Westphal, of Leipzig,³²⁶ _{E. 51, H. 1} contributes a most interesting work on the nature and causation of pseudoleukæmia. The pathology of this disease is still obscure, and, while some cases approach very nearly to leukæmia, others incline rather toward pernicious anaemia. Twenty-one cases which have been studied in the clinic at Leipzig are detailed, and from these, as well as from the contributions of others, the author is led to believe that infection plays a prominent rôle in the etiology, local diseases of the mouth probably furnishing the means of entrance of the infectious agents in most cases. Westphal thinks it unlikely that there is a direct relation of tuberculous infection and pseudoleukæmia. A case of Hodgkin's disease that ran an acute course—only about forty days elapsing between the first appearance of glandular enlargement and the *exitus letalis*—is reported by Carmine.⁵⁸⁹ _{July 8, 1902} A careful search for a specific micro-organism yielded negative results.

SCURVY.

Leduc, of Nantes,¹²⁷ _{Nov. 12, 1902} reports a case of scurvy in an old man, aged 72 years, who had lived under the best conditions, and in whom the ordinary causes of scurvy could be eliminated. [We must, however, offer the comment that old persons with poor dentition frequently confine themselves to a monotonous and unsuitable diet, though fresh food is at hand.] The teeth were very

poor, and were surrounded by greatly-swollen and mushy gums. The author concluded that in this case a microbial infection of the gums had taken place, and that the general symptoms were due to systemic intoxication with poisons produced in the mouth. He ordered a wash of boric acid, and applied glycerole of salol to the diseased gums. The patient slowly recovered under this treatment alone.

Hutchinson, of London, ⁸⁰⁶ Oct., '92 reports a case of repeated haemorrhagic infiltration of the subcutaneous and intermuscular connective tissues, in which no explanation could be found excepting haemorrhagic diathesis.

Boeri ⁵⁰⁶ June reports a case of scurvy in a malarious patient. The urine contained peptones, acetone, and urobilin. Holt, of New York, ¹⁰⁷⁵ Jan. reports the case of a child, aged 14 months, which presented the features of infantile scurvy. The child was artificially fed, and at ten months swelling and great tenderness were observed about the ankles. Later the gums became swollen and soft, and haemorrhages from the mucous membranes supervened. Under suitable treatment the child immediately improved and soon recovered. Carr, of New York, ⁵⁹ Oct. 8, '92 reports a similar case, and Rogers, of Dorchester, ⁹⁹ Dec. 29, '92 two cases.

SPLEEN.

Emelianow ¹¹⁰¹ v.2, No.2 has made an elaborate study of the functions of the spleen and the influence of its extirpation on the marrow of bone. He determined the number of corpuscles in the splenic artery and in the splenic vein, in the femoral artery and vein, in the carotids and the jugular vein, and in the hepatic vein. The results were as follow: 1. The number of red corpuscles in the splenic veins is greater than that in the artery. The excess does not pass beyond 10 per cent., and is ordinarily about 200,000 to 300,000, whilst in the femoral vein the number of red corpuscles is about one and a half times greater than in the artery, the excess varying from two to three millions. 2. The number of white corpuscles in the splenic vein exceeds that in the artery by an amount greater than in the case of other companion vessels. 3. The number of young elements in the venous blood of the spleen is two or three times (or even more) greater than in the arterial blood, whilst in the other veins—*e.g.*, the femoral—their

quantity is less than in the corresponding artery. 4. The number of ripe forms is likewise greater in the venous than in the arterial blood of the spleen. 5. The quantity of old elements is greater in the splenic vein than in the splenic artery, although in this respect the difference from other vessels is not accentuated.

The presence of a large number of red corpuscles in the vein is explained by the fact that the arterial blood gives up some of its plasma to the lymphatics, hence the venous blood is rendered thicker. In reference to the leucocytes, the excess is in the young and, especially, in the adult or ripe elements, the reason for which is to be sought in the formation of these corpuscles in the spleen. The old elements undergo a partial destruction in the organ.

Montouri⁵⁸⁹ _{Feb. 17, 18; Mar. 11} has studied the bactericidal activity of the blood of dogs and rabbits after ablation of the spleen, and finds the following: (1) after fifteen days the bactericidal power of the blood declines, reaching the lowest point about the thirtieth day; (2) after a time, from two to four months, the power gradually returns and becomes normal; (3) young animals are more quickly affected than old; (4) the active agent is a ferment; (5) the destructive power for corpuscles of other animals declines with the bactericidal power.

Péter, of Paris,¹⁴ _{Jan. 8} reported two interesting cases: one of primary splenomegaly, the condition referred to in previous years in the ANNUAL; the other of leukæmia. In the first case there was anaemia without leucocytosis, and at the autopsy the spleen alone was found involved, the lymphatic glands remaining normal. Arsenic exercised a powerful temporary influence, causing rapid decrease in the size of the spleen. In the other case there was marked leucocytosis and other indications of leukæmia. Under the influence of arsenic the number of leucocytes decreased to the normal proportion, and the spleen grew smaller. Péter is decidedly inclined to the view that these diseases, primary splenomegaly and leukæmia, may be transformed, the one into the other, by the appearance of leucocytosis in the first, as in a case of Rendu, or its disappearance in the second, as in his own case.

Billig⁶⁵⁸ _{No. 1, 5} reports a case of an enlarged, movable spleen with oligochromæmia. The latter was favorably influenced by haemogallol (Kobert) in 0.3-gramme ($4\frac{1}{2}$ grains) doses thrice daily. Beeson⁹ _{July 22} reports a case of floating spleen in a woman, in whom

death was caused by a twisting of the organ on its pedicle, rupture, and intra-peritoneal haemorrhage.

Kuttner, of Berlin,^{4 Nov. 44, 45, '92; 2 Dec. 24, '92} refers to the causes of enlargement of the spleen in children. Among the acute enlargements, those occurring in vaccine disease, tonsillitis, icterus, and meningitis are not usually mentioned. Chronic enlargement may be due to heart disease, or, much more rarely, to genuine portal obstruction. In 60 cases of rickets he found the spleen enlarged in 44. Congenital syphilis leads to rickets, which, in turn, occasions the splenic enlargements ascribed to the former. The enlargements of malaria, leukæmia, and pseudoleukæmia are, of course, well known.

Masi¹⁰²²_{Jan.} reports a case of primary lymphosarcoma of the spleen, with secondary growths in the omentum and the mesentery, in a man of 31 years. The examination of the blood revealed a normal number of white corpuscles; the red were diminished to 1,150,000; poikilocytosis was not present. Gorget⁷_{Feb.} reports a case of double serous cyst of the spleen in a man who had suffered from valvular heart disease with loss of compensation.

TRANSFUSION AND SALINE INJECTIONS.

Moramarco⁵⁸⁹_{Nov. 5, '92} publishes the results of his studies on the comparative value of transfusion of blood and injections of saline solutions in various kinds of poisoning. His conclusions are: 1. In poisoning by CO the direct transfusion of blood, homogeneous or heterogeneous (as from rabbit to dog), will resuscitate the apparently dying animal, while a solution of sodium chloride does not possess this power. 2. The transfusion of blood will not save an animal poisoned with morphine; the sodium-chloride solution, on the other hand, will do so. 3. Against the toxalbumen of the diphtheria bacillus both agents are powerless.

Sciolla³⁴_{Nov. 22, '92} found that blood-pressure which had been lowered by haemorrhage could be raised to the normal by intra-venous injection of NaCl solutions, provided the loss did not exceed two-fifths of total quantity of blood. The maximum deprivation of blood which the body can endure, and which can be compensated by salt infusions, is equal to 5 per cent. of the body-weight. Ilberg⁷⁵_{Jan.; Feb. 18} found that subcutaneous injection of normal saline solution increased the appetite for food, and was therefore useful

in treating insane patients who refused food. Trying it on himself, he found that, after fasting for a time, the injection caused salivation, with a salt taste in the mouth and keen appetite.

Thayer, of Portland,²² reports a case of haemorrhage in typhoid fever in which excellent results were obtained by subcutaneous injection of saline solution. Ziemssen³²⁰ details his new method of direct transfusion of blood. Two small hollow needles are inserted into a vein of the patient and of the person furnishing blood, without cutting the skin. Then, by means of glass syringes which fit accurately into the needle, blood is taken from the healthy person and injected into the patient's vein. In this operation Ziemssen requires that three syringes shall be used, so that the withdrawal of blood by one and the injection into the patient's vein by the other shall be simultaneous, while the third one is being cleansed with normal saline solution. Using this method there is no danger of serious accidents, but a little fever is frequent. Three physicians, however, are necessary to perform it.

Warman, of Kiel,¹¹⁶ speaks warmly of rectal injections of saline solution after haemorrhage. He was first led to this practice in the case of a woman who had had large haemorrhage following abortion, where he could not get the proper instruments for hypodermoclysis. The result was gratifying. The entire litre or two litres injected are absorbed, he feels, in four or five minutes. The first indication of the rise of temperature toward the normal is a chill. Then follow fuller and stronger pulse and general improvement. Cool water is more active and more quickly absorbed than warm.

Dawbarn, of New York,⁵⁹ makes a further report of his method of arterial injection of saline solutions for haemorrhage, shock, cholera, and the like, and replies to the objections that have been offered on the ground that the insertion of the needle is difficult. He uses a large hypodermatic needle, and thrusts it into the femoral artery slowly, at the middle of Poupart's ligament, holding the needle perpendicularly to the vessel. With a Davidson syringe a pint of hot saline solution (120° F.—48.9° C.) is then slowly injected, and, in urgent cases, subcutaneous injection and enteroclysis are performed at the same time. Of the three cases reported in this paper one recovered, and of the two fatal in one death followed exertion and sudden heart-failure. Dawbarn insists

that the quantity of fluid must be greater than has been used by most practitioners, because the blood-vessels are dilated by shock; and he further insists that the temperature should be very high (120° F.). Even 140° F. (62.8° C.) will do no harm. On both of these points Sternberger ⁵⁹ _{Jan. 7} is in entire accord. He reports two cases in which recovery ensued, and bases his successes (as compared with eight fatal cases treated previously) on the quantity and temperature of the saline solution used, and on the liberal administration of strychnia.

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